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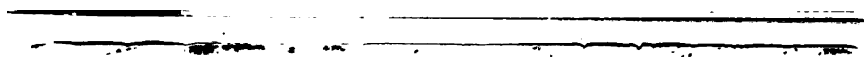
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PORT OF ASUNCION

E. Plon, Monnet et Co., Paris.

PARAGUAY:

THE LAND AND THE PEOPLE,
NATURAL WEALTH AND COMMERCIAL
CAPABILITIES.

BY

DR. E. DE BOURGADE LA DARDYE.

ENGLISH EDITION,

EDITED BY E. G. RAVENSTEIN, F.R.G.S.

With Map and Illustrations.

LONDON:

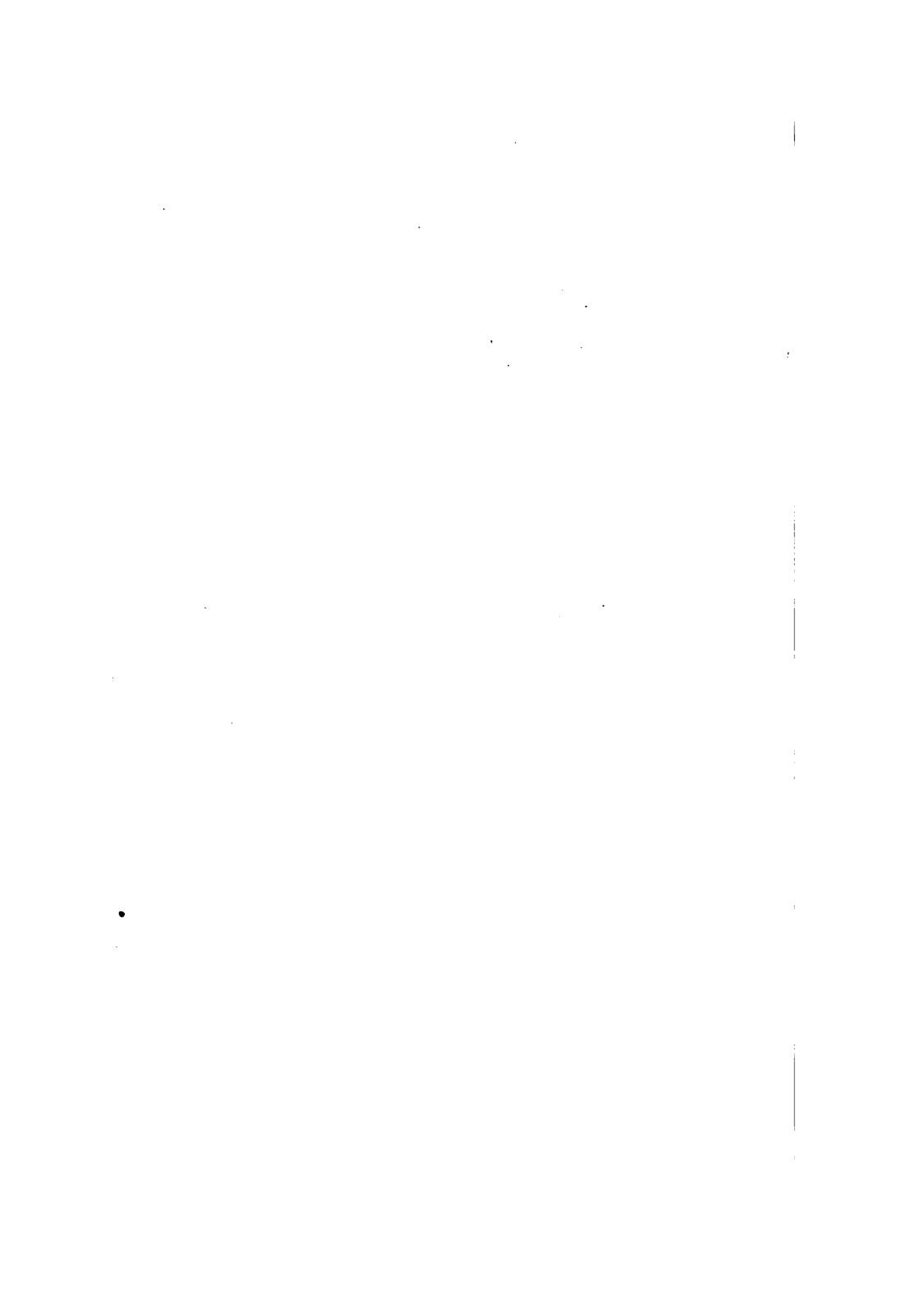
GEORGE PHILIP & SON, 32 FLEET STREET, E.C.

LIVERPOOL: 45 TO 51 SOUTH CASTLE STREET.

1892.

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TO
DON BERNARDINO CABALLERO,
LATE PRESIDENT OF THE REPUBLIC OF PARAGUAY,
A GALLANT SOLDIER,
WHO FOUGHT BRAVELY FOR HIS NATIVE LAND;
A STATESMAN,
WHO DID MUCH TO RAISE IT FROM THE RUIN INTO WHICH
IT HAD FALLEN;
THIS BOOK IS DEDICATED,
AS AN EXPRESSION OF SINCERE AND DEVOTED FRIENDSHIP,
BY
E. DE BOURGADE LA DARDYE.



PUBLISHERS' PREFACE.

In placing a translation of M. E. de Bourgade's work on Paraguay before the public, the publishers believe they meet a want, as there exists no work of recent date in the English language which supplies full and trustworthy information on that South American Republic. M. de Bourgade, a gentleman of culture and scientific attainments, qualified himself for dealing authoritatively with his subject by a two years' residence in the country. He has, moreover, conscientiously consulted the labours of the most able of his predecessors, and his statements deserve, consequently, to be received with confidence.

If the author exhibits some prepossession in favour of a country, the gentle inhabitants of which received him with marked courtesy, this is only what might be expected. This prepossession, however, has not betrayed him into overrating the advantages which Paraguay holds out to settlers and men of business. He neither presents us with an overdrawn picture of its natural resources, nor does he overrate the capacity of the present population, with its limited resources, to develop them. His is not an appeal to the masses to take possession of the fertile acres of a thinly populated country, but a sober statement of facts, which men desirous of extending British enterprise, and especially capitalists acquainted with the conditions of life in a subtropical region, would do well to ponder over.

The author's statements are borne out by independent witnesses whose impartiality can hardly be doubted, M. Wodon,* the Belgian Consul, who visited the Colony of Villa Hayes in 1891, found his countrymen established there perfectly satisfied with their condition, and full of praise of the solicitude which had been shown

* Records Consulaires, 1892.

them by the authorities. In M. Wodon's opinion, market-gardening and dairy-farming are at present the only resources of small agriculturists, but he speaks highly of the future of plantations and the prospects of agricultural industrial establishments, which, in his opinion, are sure to prosper if carried on by competent men.

A German Consular Report,* whilst fully recognising the great resources of the country and the prosperity of small agriculturists, points out that planters would have to contend against the high price of labour. This is only natural in a thinly populated country, but in proportion as population increases, so will the facilities for obtaining labourers increase likewise.

The most recent English Consular Report, by Mr. H. Herbert,† is couched in equally favourable terms.

To Englishmen, more especially, some trustworthy information about Paraguay should prove acceptable, not so much because of the tragic history of a country which, in an age gone by, has been the scene of the socialistic labours of the Jesuit missionaries—and which, under the elder Lopez, attained a remarkable degree of prosperity, all of which was destroyed by the insensate conduct of his son—but rather on account of the openings which Paraguay holds out to British enterprise.

The number of Englishmen in Paraguay is still small, but the British capital already invested in that country is very considerable, and far exceeds in amount the investments of all other European nations combined. The steamers navigating the great rivers are British ; the railway is British ; and so are the tramways. Most of the banking capital of the country is British, and a considerable proportion of the public lands has become the property of the British bondholders. If commercial transactions have largely passed into the hands of Germans, it is nevertheless a fact that even now fully one-half of the imports are of British manufacture or origin.

* Deutsches Handelsarchiv, 1892.

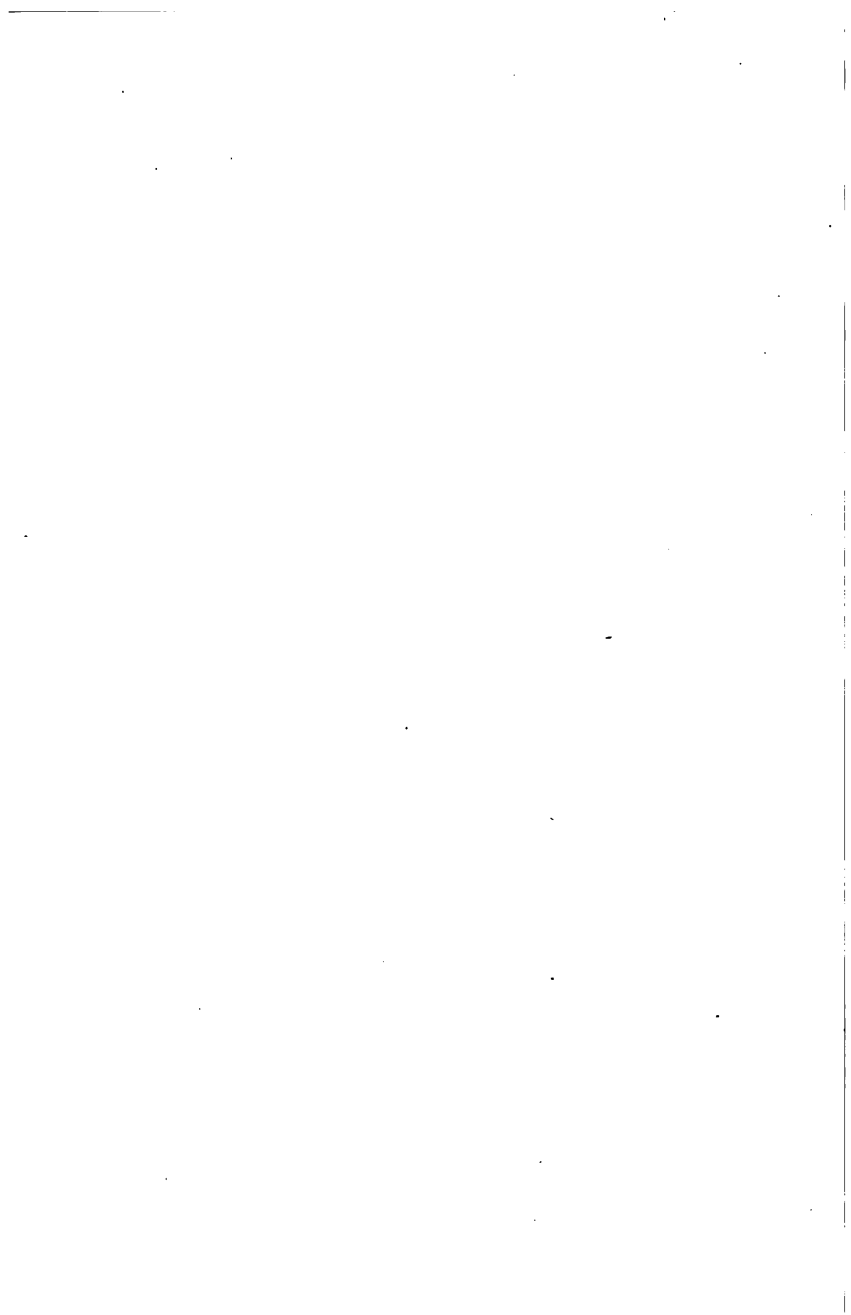
† Diplomatic and Consular Reports, No. 1006, 1892.

Mr. Herbert, in the Report already quoted, points out very appropriately that if some of the English Companies have not succeeded, this is due in a large measure to the managers on the spot being controlled by boards of directors thousands of miles away, to whom everything has to be referred, and who are frequently in absolute ignorance of the local conditions of trade, and of the resources of the country, in which their Companies operate.

It is exactly on these points that M. de Bourgade's book will prove of service. In order still further to enhance its utility, an Appendix has been added, which will be found to contain the most recent statistics available.

The Map which accompanies the volume is the first trustworthy map of the country ever issued, and is largely based upon unpublished materials.

LONDON, *July, 1892.*



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Map of the Republic of Paraguay, drawn by E. de Bourgade, at end.

PARAGUAY.

PART I.—PHYSICAL FEATURES.

CHAPTER I.

GEOGRAPHICAL EXPLORATION.

Situation of Paraguay—Boundaries—Published sources of reference—Father Quiroga—Page—Admiral Mouchez—Leverger—Toeppen—Olaf Storm—My own researches.

A GLANCE at the map of South America at once reveals the fact that the bulk of its population is massed along the coast. The inhabited zone forms one continuous girdle round the land, extending from the torrid shores of the Gulf of Panama, to the ice-bound rocks of the Straits of Magellan. Sometimes, as in Bolivia or at Buenos Ayres, this zone widens out; sometimes, as in Chili and in certain parts of Brazil, it is reduced to a mere strip, enclosed between the sea and the cordillera; but nowhere does it lose its character of a border, bounded on the one hand by the ocean, on the other by the vast solitudes of the interior. To this general feature there is but one exception.

On the shores of the Atlantic, in lat. 35°, the estuary of the La Plata spreads itself out. Into this debouches one of the largest rivers of the world, the Rio Parana, which ploughs its deep and gigantic way through the soil of America, and, aided by its affluent the Rio Paraguay, opens into the very heart of the continent a fine navigable highway "like the sea,"* the banks of which are as populous as the ocean-coast.

* According to some writers, the Guarani word "Parana," signifies "like the sea." I cannot vouch for the accuracy of the etymology, as I have been

At the time of the conquest, the Spaniards, having ascended the river for nearly a thousand miles, founded one of their most flourishing colonies on its bank. This at the present day bears the name of Paraguay, and constitutes a Republic, which is the only inland State of South America. Its land-locked position gives it quite a unique character, which will, in all likelihood, cause it to play in future no insignificant part amongst surrounding States.

After being long undefined, the boundaries of Paraguay became the subject of protracted disputes, often degenerating into bloody wars between the powers of Spain and Portugal, and subsequently between the Free States of America. In 1870, after the terrible struggle which convulsed the States, the frontier question with Brazil and the Argentine Republic was settled, the boundary being definitely established by an international commission.

Lying at the point of confluence of the two rivers, the Parana and the Paraguay, the territory of the Republic is divided by the latter stream into two distinct sections, situated respectively east and west. This natural division of the country is not merely geographical, but, as will be shown, it corresponds with the geological formation of the soil, as likewise with the economical condition of the inhabitants. Taking, therefore, the river as the basis from which our observations may start, we may proceed to describe the frontiers of these sections of the Republic, Eastern Paraguay, or Paraguay proper, and Western Paraguay or the Chaco.

Eastern Paraguay is bounded on the north by the rivers Apá and Estrella, on the east by the cordilleras of Amambay and Mbaracayu, and by the Parana, which runs also along the south. It lies between lat. 22° and 27° S., and long. 54° and 58° W., and is enclosed on all sides by Brazil and the Argentine Republic.

unable to trace it in the modern Guarani. One thing seems certain, that the root "para" signifies dappled, or covered with bright patches. It is found in the word Paraguay (para-gua-y), which may be interpreted as betokening "water in which are bright spots." The word Parana is doubtless analogous. In any case it may be presumed the root "para" may apply to the sea. Hence the confusion.

The Chaco, *i.e.*, Western Paraguay, occupies, in the main, a more northerly situation than Eastern Paraguay, extending, in fact, along the inland river, from the mouth of the Rio Pilcomayo, in lat. $25^{\circ} 20'$ S. (Mouchez), to that of the Rio Negro, in lat. $20^{\circ} 10'$ S. (Page).

The form of this eastern section is quadrilateral, bounded on the east by the Rio Paraguay, on the south by the Rio Pilcomayo, on the north by the parallel intersecting the mouth of the Rio Negro, and on the west by a line separating the Chaco from Bolivia. This western line has not yet been laid down accurately upon our maps. It runs from the Pilcomayo to lat. $22^{\circ} 10'$ S., and agrees approximately with a meridian $62^{\circ} 10'$ W. of Greenwich.

It is thus apparent that the frontiers of the Republic are not all indicated by natural landmarks: it is interesting therefore to inquire into the origin of the conventional lines of demarcation, and to gather up whatever information bears upon the settlement.

Upon this point there exists numerous geographical documents that may be consulted. In fact, ever since the conquest, the country has been the subject of investigations, initiated at one time by private individuals, at another, by official order. When the Jesuits came to America on their missionary enterprises, it was ordinarily one of their first concerns to obtain, as far as possible, a scientific knowledge of the districts which they aspired to evangelize. One detachment of their party might devote themselves to the work of colonization, but others would not fail to be occupied in studying the Indian languages, in observing the natural history, or in making local explorations. Some ascended the Upper Parana, pushing onwards towards the sources of the Rio Paraguay, some meanwhile penetrating far into the wildernesses of the Chaco.

Maps of greater or less accuracy were thus drawn up and forwarded to Rome or Madrid, and in this way some elements of South American geography were gradually established. Father Quiroga, one of the most energetic agents in the movement, made numerous observations connected with the latitude

of various places, which he published in his "Description du Rio Paraguay."

Simultaneously with the arrival of the Jesuits came bold Spanish adventurers, such as Ayala, Cabeza de Vaca, and Chaves, who took possession of the territory in the name of the Spanish crown, overran the country far and wide, and penetrated even to Peru, thus opening up fresh districts to geographical research. Later on, when the national rivalry between Spain and Portugal made the assignment of definite limits to the respective territories a positive necessity, various scientific commissions were despatched into the interior, and Cabrera, Fonseca, Alvear, Flores, and Azara succeeded in ascertaining the real conditions of the region with more precision; and now, within our own time, the missions that have been maintained by the governments and societies of Europe and America have effected a still larger advance in our knowledge of the country, the valuable labours of Leverger, Page, and Admiral Mouchez having put to rest many questions that were hitherto unsolved. Still, however, there remains much to be done, and a vast field lies open yet for explorers in the future.

How much yet remains to be settled may be recognised by a comparison of the various maps that have been published up to the present date. Some of these maps present details of the highest interest, such as those of the Jesuits, of Azara, Flores, Page, and Mouchez; the same may be said of the almost unknown productions of Leverger, of those issued by the commission of 1872, and even of the slight sketch by Toeppen; but others there are which are mere compilations, amongst which must be included the publications of Brayer, Wisner of Morgenstein, and more recently of Nolte, all of which appear to have been adapted from what were already in existence, and which consequently only reproduce or exaggerate the errors of their predecessors.

As the result of a careful scrutiny of all these various documents, it may be safely concluded, as we shall endeavour to demonstrate, that there are many *data* referring to the whole course of the Rio Paraguay, to a portion of the course of the

Rio Parana, and to certain valleys of the interior, which are to be accepted as accurate. At the same time it admits of no doubt that there is an urgent necessity for revising the maps of those regions which abut upon the eastern frontier, as well as those which profess to delineate the courses of the rivers in the central districts and in the Gran Chaco.

Eminently trustworthy are the works of Admiral Mouchez, who has described the course of the Rio Paraguay from its confluence with the Parana to the Rio Apá; his researches may be classed amongst the most valuable contributions to the geography of South America. The same remark applies to the maps of the Rio Parana from Corrientes to Villa Encarnacion and the valleys of the Tibicuary and the Manduvira. Except for a few matters of detail, these maps are amply sufficient as a base for subsequent investigation. With regard to the course of the Upper Paraguay, a great measure of reliance may be placed upon Lieut. Page, whose representations may very easily be checked by the aid of Leverger's researches. Nevertheless, in spite of the unpublished investigations of the Brazilian navy, it would be a matter of much interest if a new survey could be made of these regions, which, however fairly known to river-pilots, have only been described in an imperfect and inadequate way.

This was a task which I set myself in September, 1888; unfortunately, a serious wound which I received shortly afterwards in the Brazilian Province of Matto Grosso prevented my prosecuting my design. The attack which I suffered, together with my lamented companion, Henry Rochefort, jun., left me so prostrated in health that to proceed with my topographical research was out of the question. Nevertheless, the map that is published at the end of this volume is marked by a number of important corrections, as well as by some new insertions relating to that portion of the River Paraguay which flows between the Apá and Bahia Negra.

The boundary commission which, after the war in 1870, determined the frontier line between Paraguay and Brazil, prepared some maps which, though never published, are of considerable interest. The survey embraced the northern and eastern

frontiers, following the course of the Apa, the Sierras Amambay and Mbaracayu, and the Central Parana. Although most conscientiously done, it requires some rectification, and does not completely accord with my own personal observations in the valley of the Ygatimi, which skirts the northern side of the Sierra Mbaracayu, nor does it agree with the longitudinal position which I assign to the Salto de Guayra or Sete Quedas, the extreme limit of the Paraguay Republic on the Upper Parana.

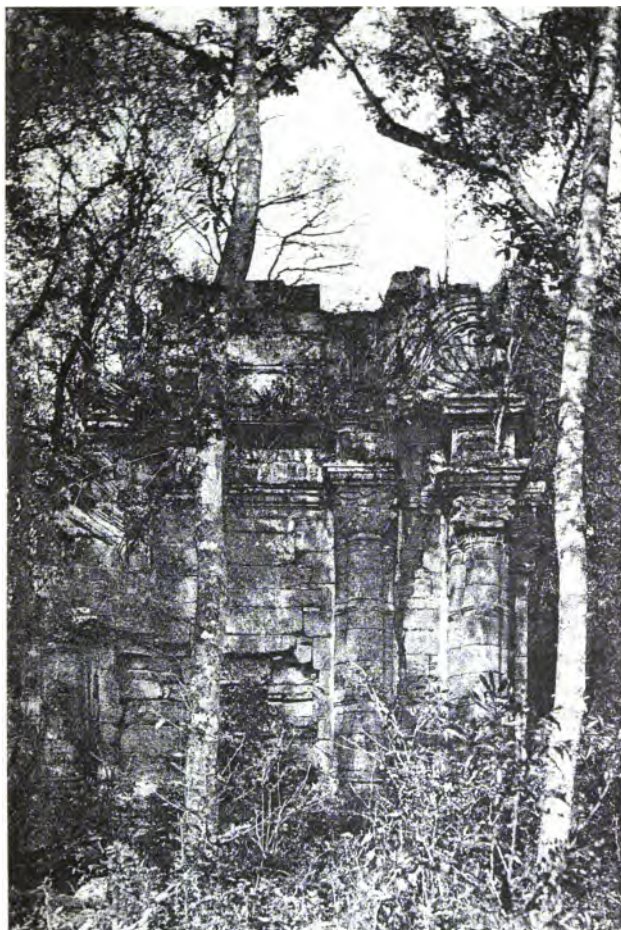
The observations taken by Page have fixed the geographical co-ordinates of many points in the interior of Eastern Paraguay; Johnston's map has thrown light upon certain portions of the Paraguayan missions, whilst that sketched out by Toeppen has defined the course of the Aguara y Guazu.

Such are the original documents which supply the materials for compiling the geography of Paraguay; and if to these I may be permitted to add the outcome of my own individual researches in the valleys of the Jejuy and its affluents, on the Sierra Mbaracayu, in the basin of the Ygatimi, at the Salto de Guayra, and on the Upper Paraguay, the enumeration of published authorities must be considered complete.

Except in a few isolated particulars, all other maps tend to the perpetuation of errors that had previously been made. I have made it my endeavour that my own map shall present a *resumé* of what have been ascertained to be established facts.

As regards Western Paraguay or Chaco, there exist hardly any documents that can be esteemed of value. Unless it be for the part to the N.W. of Bahia Negra, Minchin's map, with reference to Chaco, is of no practical service. The only publication which, in my opinion, can be reckoned of any use, is the outline put forth by Olaf J. Storm after the expedition made by Major Feilberg, of the Argentine Republic, to the Pilcomayo, but this is very limited in its scope, not extending more than a degree and a half into the interior.

It is upon the sole evidence of these authorities that the geography of Paraguay has to be written; upon this evidence I have had entirely to rely, except so far as my own investigations have assisted me. I should, however, add that the works



E. Plon, Nourrit et C^o, Paris.

RUINS OF THE CHURCH OF SAN IGNACIO

BUILT BY THE JESUIT MISSIONS

of the various engineers who, for some time past, have been engaged in surveying the territory of the Republic, have furnished me with some useful information; and I must not omit to mention the two very interesting publications by Dr. Demersay and Colonel du Graty, which, in 1850 and 1860 respectively, served to remind Europe that Paraguay was still in existence.

r.

CHAPTER II.

A GEOLOGICAL SURVEY.

General aspect of Paraguay—The Central Cordillera—Faults of the Rio Paraguay and Rio Parana—The Chaco in the pliocene period—Appearance of the Sierra Mbaracayu—Secondary lines of dislocation—Volcanic eruptions of basalt and lava—Great erosions.

PARAGUAY is not a mountainous country, yet, when compared with the flats of the Argentine Republic, it might almost be classed as one of the most hilly districts of Central America. Yet no imposing ranges are to be found there, and the name of mountain can hardly be assigned to the succession of hills of which the loftiest rarely exceed 1,500 feet in height, their general aspect bearing a resemblance to the picturesque features of Biscay.

Starting from the banks of the Rio Paraguay, and proceeding towards the eastern frontier, the traveller will at first cross slightly undulated plains, over which, in countless meanderings, flow the streams that descend from the central watershed. As he advances he will observe that the scenery alters its character; the hills become more numerous, the horizon grows more contracted, and eminence after eminence, surrounded by luxuriant verdure, breaks upon the view. No sharp peak or rugged crest ever interrupts the rounded outline of the distant ridges. Occasionally, in a gorge somewhat narrower than the rest, though not deep enough to be sombre, a mountain stream leaping down amongst barren rocks will appear to be assuming the character of a torrent; but in its general aspect the country has none of the stern and rugged features of a true mountainous region.

Only in the Andes are tokens of the convulsions of the rocks to be observed. Here everything is smiling and harmonious. The culminating point of the central chain is alone distinguished by a somewhat sharper outline, while from its forest-

bed a rocky crest uprears itself, in striking contrast to the bush-mantled surface of its lower ridges.

And yet, like the Andes, these hills have passed through a period of great and terrible dislocation ; the time has been when they have reared up their lofty summits to the skies.

Long before the mighty upheaval of the great Cordillera these very hills sustained the continent of America, and protected its eastern plateaux from the incursions of the sea. The action of the climate has wrought their decapitation ; torrents unceasing and inexhaustible, permeating the entire soil while it was in the very process of formation, debased their topmost crests, filled up their crevices, and little by little the unremitted work of erosion denuded the mountain-flanks of the granite by which they were upheld. Portion after portion has crumbled away, and the fragments have had an enormous share in filling up the vast estuaries which indented the American coast-line at the tertiary era.

Towards the north, in the direction of the extensive plateaux which divide the basin of the Amazon from that of the Parana, there survive some imposing ridges which have resisted the action of time. Here the streams, near their original sources, had not acquired sufficient momentum to have the effect of levelling the mountain-tops in their descent ; it was only lower down, as they approached the ocean, that they had accumulated the volume and velocity that displaced or destroyed whatever obstructed them, so that the whole chain of mountain was so near being annihilated that only the rarest traces of its former existence can be found. And, more than this, not only have the eminences been levelled, but such has been the violence of the waters that ever and again they have ploughed for themselves a passage through deep ravines.

Although the development of these great geological phenomena has thus, to so large an extent, effaced the primeval outline of the sierra, and its residuum is now concealed by a luxuriant overgrowth of tropical vegetation, yet the historical importance of the ridge is still apparent from its very position, and from the part which it fulfils as the division-line of the waters.

Along its whole extent, from about lat. 15° , where it connects the central plateau with its southern limit on the banks of the Uruguay, this vast ridge may be regarded as the real axis of the southern half of South America. It partitions the immense basin of the Parana into two sections; one to the east, including the Upper Parana, the other to the west, including the Paraguay. To explain fully its geological importance would be to enter into scientific particulars which lie beyond the scope of this work; but I hope before long to publish a complete account of my own investigations on this subject. In order, however, to convey some little idea of the nature of the soil of Paraguay, I must beg to be pardoned for introducing a few dry geogenic details.

It was probably the pliocene period that witnessed in their greatest intensity the phenomena that gave the American continent its present configuration. These phenomena, I imagine, were developed in two distinct phases; the first being characterised by the formation of the Sierra Amambay, and afterwards by that of the Andes; the second dating from the commencement of the quaternary epoch, and extending to the upheaval of the Sierra do Paresis.

The former of these movements, which for distinction's sake we may call the plication of the Andes, was gradual, and was effected by a lateral compression, east and west, resulting in a series of undulations, parallel to the present position of the Andes, and extending from the shore of the Pacific Ocean to the depression of the Atlantic.

All these mountain ranges, with the exception of the Sierra do Mar, face westwards, that is to say, their steepest slope is in that direction.

Of all these the most important is that to which we have already referred as the axis of Paraguay, and the central ridge of the Parana basin. Under the name of the Sierra Sejada, it starts from the Brazilian province of Matto Grosso, skirts the frontier of Paraguay in long. 55° W., under the name of the Sierra Amambay, which it loses at lat. 24° S. From this point it takes a S.S.W. direction, crosses the territory of the Republic under the names of the Cordilleras of Urucuty, Caguazu,

and Villa Rica successively, reaches the Parana in lat. $27^{\circ} 20'$ S., where it causes the Apípe rapids, then enters the quarters of the Argentine missions, and finally loses itself in the territory of the Eastern Republic of Uruguay.

On either side of this central axis (which Élie Beaumont designates a great "fold" or "tuck") are deep depressions: the one on the west being steep and extending to the Andes, the other on the east sloping towards the Sierra do Mar.

In the course of the disturbance two great breaks, or faults, were formed in the earth's crust, one of them beginning in long. 58° W., the traces of which I could follow for some hundreds of miles, where the parallelism of the terrestrial strata continues broken. All the eastern part of the land remained upheaved, like a gigantic wall, whilst the western zone sank down to a considerable depth, allowing the pliocene sea to penetrate to the very heart of America.

Parallel to this fault, and in a corresponding position with regard to the Sierra Amambay, there is another somewhere near long. 54° W.; it faces west, but its depression is not so great as that of the western fault.

These two breaks extended all along the central chain, which remained upheaved like a long band surrounded by the pliocene sea, from the waters of which were deposited the sedimentary strata which now constitute the soil of the green plain of the Argentine Republic and Chaco.

Convulsions such as these would not occur without bringing to the surface igneous matter from the bowels of the earth. Hence, all along the faults, volcanic chimneys yielded an outlet for the basaltic formations which may be seen in many parts of the region, and of which there is a fine specimen at the Cerro de Tacumbu, near Asunción.

It is obvious, moreover, that the effects of this settling of the earth's surface did not end here; throughout the latter part of the tertiary era a transformation was going on, the effects of which were to be apparent at the commencement of the quaternary period. The process of cooling would supervene, and thus a further subsidence would follow on, gradually causing fresh creases. These new folds, however, would not

this time be formed in the same direction as those of the preceding epoch, because there now existed insurmountable barriers to offer effective resistance to any compressions from east and west. On the one hand were the Andes, in the centre was the Sierra Amambay, and on the other hand stood the Sierra do Mar.

All the forces of nature now proved themselves comparatively powerless, except as they coincided with the axis of the mountains ; consequently all compression was effected from north and south, and this resulted in the formation, in lat. 12° S., of that great transversal chain which, known as the Sierra do Paresis and Sierra Azul, separates the basin of the Amazon from that of the Parana. Simultaneously, and as the outcome of the same influence, various other geogenic folds were brought into position all following the same direction, being at right angles to the folds of the pliocene formation. Amongst them may be enumerated the Sierra dos Pyreneos in lat. 15°, the Sierra de las Quinze Puntas in lat. 20° 30', the Sierra Mbaracayu in lat. 24°, and the Sierra dos Misiones in lat. 27°.

The resistance offered to the movement by the great pliocene chains in many cases altered the original direction of the faults, and availed to produce a whole network of secondary creases, compressed in their character, and trending from N.W. to S.E. To this subsidiary system belong the Costa Pucu, near Asuncion ; the Cordillerita, the chain which joins Mt. Acay : further north the branches of the Fecho dos Moros, the Rabicho range, below Corumba, and the Cordilleras del Juncas in lat. 18°. Due likewise to the same influence, no doubt, is that network of breaks which I was able to investigate during my exploration of the basin of the Ygatimi. So also is the origin of those eminences to be accounted for which in the region of the Chiquitos constitutes the basins of the Jauru, an affluent of the Paraguay, and of the Rios Guapore and Mamore, sub-affluents of the Amazon.

It will thus be apparent that the geological disturbance extended over an immense area, and was attended with the further result that it raised all the strata of the upper crust of the entire stretch of land from the Andes to the Sierra Amambay, and exposed the surface of the plains of Chaco.

From this succession of movements resulted the general configuration of the great Parana basin. The water-system was definitely established. In the huge break of long. 58° flowed the Rio Paraguay; the Rio Parana retreated to the upper portion of the break in lat. 54° , but, coming in contact with the impassable chain of the Misiones, it was diverted from east to west, and reached the fault in lat. 58° , where, mingling its waters with those of the Paraguay, it assumed the course which it has maintained to the present day. In the lower section of the fault forsaken by the Parana are collected the waters which are now known as the Rio Uruguay.

Towards the end of the preceding period eruptive phenomena again occurred, and craters were opened at various places amongst the breaks. The outflow of lava was considerable, but traces of this are now difficult to identify, because well nigh all the streams have been covered by recent alluvia, which in many districts, where watercourses are numerous, have assumed enormous proportions. Yet, although they are rare, I have discovered several notable prominences where the lava remains, one, amongst others, in the valley of the Mbac-y, near Paraguari and the Serro d'Acay.

Such, in rough and general outline, is the geological record of the Parana basin. Its main features have been gathered by me during my travels in the interior, which afforded me continual confirmation of my views. Especially interesting was my study at the rapids of the Ygatimi, and it is due to the knowledge that I so gained that I was able to foresee and establish the navigability of the rivers Y-hoby and Y-pyta. Drawing our conclusions from the same facts, we may now proceed to study the hydrographical character of the region.

CHAPTER III.

THE BASIN OF THE PARANA.

The two great valleys of East and West—Successive populations—Jesuits and Spaniards—The valley of the Parana—Sources of the river—Three sections of the river—The Upper Parana—The Cataract of Guayra—The Central Parana—Affluents.

FROM a geographical point of view, the interior of Paraguay must be acknowledged to be known but imperfectly.

The vast virgin forests extending through the east and north have presented an obstacle to travellers before which they have recoiled.

Beyond the valley that reaches from Asuncion to Villa Encarnacion, except for a few roads that have been opened for the purpose of exploring the forests of yerba-maté, there are hardly any highways of communication, almost all transports being conducted along the rivers, upon the banks of which the population is mainly concentrated.

In order, therefore, to give the most practical view of the country, it may seem best to confine our observations to the several water-courses. Having dealt in the preceding chapter with the configuration of the land, we may proceed to gather from the study of the hydrographical conditions of the country as good an acquaintance as we can with its physical geography.

The whole territory, as it has been stated, is divided into two basins, that of the Parana to the east, that of the Paraguay to the west. At the present time the former of these is of minor importance ; all life, energy, and progress seem to be centred in the valley of the Paraguay, and especially on its left-hand shore.

It is noteworthy that, in the 17th and 18th centuries, a contrary state of things existed. It was then the Parana valley that was the more wealthy and populous of the two, and it

was along the banks of that river, that are now well-nigh covered with impenetrable forest, that the mission-stations of the Jesuits were planted.

The explanation of this change in the seat of colonization is not to be found in any difference of degree in the fertility of the soil, inasmuch as the two valleys would appear to be equally productive and easy of cultivation ; the reason is to be traced entirely to the different tempers that animated the colonists at different periods.

When the Jesuits arrived, prompted by the desire to civilize the peoples of the new continent, it did not seem desirable that their young neophytes should be brought into close contact with the residents already settled ; it suited their ideas better that they should be so separated as to form an isolated community, living on their own resources, and only mingling with the population with the aim of christianizing it. For this design the vast wildernesses beyond the Parana seemed in every way to be adapted to their requirements. The locality was so far removed from the ordinary haunts of men that in order to reach their settlements it was necessary to cross the marshes of Nembucu or the Ibera lagoon, if not to venture over the Apice rapids, and only few would be tempted to undertake the journey. Thus the missionary settlement was at once well sheltered, and quite secure from intrusion by outsiders.

The time, however, came for the Jesuits to be expelled from their quarters. The Spaniards, having reduced the land to subjection, brought about a new system of colonization. Under new masters, new views were opened. The conquerors having no other aim than to utilize for themselves the labours of the Indian, and to promote an export trade, were quick to see that no advantage was to be gained by remaining in isolated valleys difficult of approach, and in no way adapted for commercial enterprise. Was not the Rio Paraguay navigable throughout its course ? Did it not promise every facility for agricultural work ? Accordingly, every means were taken and every inducement held out to attract population to its shores, with the result that by degrees the settlements on the Parana became totally deserted.

At a subsequent time President Francia tried to revert to the system of isolation that had been favoured by the Jesuits, but he did not realize that matters were no longer under the same conditions, failing to foresee how inevitably the Paraguay must become a great highway to which settlers would flock. His scheme was altogether destitute of the bulwarks of protection which had been provided by the Jesuit fathers ; as such it was bound to fail, and fail it did, most ignominiously.

It seems necessary to enter into these particulars in order to explain the marked difference between the two basins as exhibited at present, the one entirely open to navigation and with easy means of communication with the world, the other equally rich in natural resources, but quite deserted, though only waiting the introduction of railways to start it towards that grand future for which it is destined.

The basin of the Parana is, as we have noted, separated from that of the Amazon by the central plateau which runs from east to west between the Sierra d'Espinasso and the Andes. At about long. $47^{\circ} 40'$ W. the plateau makes a bend to the S.S.E., forming an eastward boundary to the basin of the Rio San Francisco. In the angle thus formed between lat. 15° and 22° , are the original sources of the Parana. Two important streams result ; one the Parana Hyba, flowing from the N.E., the other the Rio Grande, proceeding from the E. ; uniting in lat. 19° , these become the Parana proper.

Some miles lower down navigation is blocked by the cataract of Urubupunga, the river flowing onwards from N.N.E. to S.S.W. as far as lat. 24° , where its course is again broken by the cataract of Guayra. Down to this point I call the river the Upper Parana, reserving the name of the Central Parana for the portion which lies between the Salto de Guayra and the mouth of the Paraguay. The whole district of the Upper Parana belongs to Brazil.

It was in the 16th century that the Jesuits selected this fine spot for their settlement. I visited it in the course of my late exploration, and am convinced that no more eligible site for colonization could be imagined. All that is wanting is some highway of communication, and this I am considering

some measures to secure. The plains are watered on the right bank from the N. by the rivers Pardo, Yvinehima, Ygurey or Money, Amambay-guazu, Mbaraca-y, and Ygatimi, and on the left by the Tieté, Paranapanema or Ypane, Ibahy, and the Peguiry. The stream throughout its course here is perfectly uniform, and were it not closed at its ends by the cataracts of Urubupunga and Guayra it might be navigated by large vessels. The general knowledge of the region is more or less vitiated by error, but I am indulging the hope of publishing an account of the district, which however does not come within the scope of this book.

At the Salto de Guayra, or Sete Quedas (the seven falls) as the Brazilians call it, stands the frontier of Paraguay. The river first skirts the territory of the Republic from N. to S., then flows E. to W. as far as the confluence of the Rio Paraguay. It is this which I distinguish as the Central Parana; it merits special study, not only on account of its position from a political point of view, but because of the peculiarity of some of its natural features.

The geographical position of the Salto de Guayra ought, it is obvious, to be determined with strict exactness. It is not simply the spot where the Sierra Mbaracayu meets the Parana, it is the point which political treaties have assigned as the extreme N.E. limit of the Paraguayan frontier. It needs no argument to shew that if the position of this landmark is to determine the right of the possession of the soil, the adjacent states ought to be assured of the precise geographical situation of the boundary; nevertheless, up to the present date it remains a matter of no little uncertainty.

This existence of doubt as to the true place on the map for the Salto de Guayra is not difficult to explain. Situated in an absolute wilderness, all but inaccessible through the natural obstacles of dense forests on land and dangerous rapids on the water, it is so far remote from the inhabited world that it has been visited by a very limited number of travellers. The Boundary Commissioners of 1788, those of 1874, and then myself in 1887, are the only individuals who have fairly attempted to settle the matter. If the reader has any curiosity on the

question, I may refer him to the works that I have published referring to it.*

It will suffice for me to say here that all parties are tolerably well agreed as to the latitude: I place it at $24^{\circ} 2' 59''$, differing only 32 seconds from the Commission of 1874. It is with regard to the longitude that there is so wide a variation. The maps that have hitherto been published adhere to the longitude assigned by Azara in the Commission of 1788, viz.: $56^{\circ} 55'$ W. of Paris. This is notoriously incorrect, but the repetition of the error is in some measure to be accounted for by the reports of the Boundary Commission of 1874 not having been put into circulation. This latter commission specifies the longitude of the cataract as $56^{\circ} 36' 35'' 30$ W. of Paris, thus placing it $18' 35''$ further to the east than the former.

I have given the reasons which led me to consider that even this rectification was wanting in exactness, and which determined me, after my exploration of the Rio Ygatimi, to ask the Government of Paraguay to organize a scheme of investigation by which the doubt may be dispelled. Until this has been granted I venture to think that I may hold to my computation that the precise longitude of the cataract is $56^{\circ} 18' 8''$ W. of Paris, i.e., $53^{\circ} 57' 53''$ W. of Greenwich. This is the estimate upon which I have drawn up the map appended to this work, and the rectification is important as attributing to Paraguay its proper breadth.

A comparison of the maps issued before 1874, and those of more recent date, will exhibit the various errors that have been made.

With the exception of Admiral Mouchez' carefully executed map, shewing the course of the Paraguay, all the other maps concur in depicting the eastern confines of the Republic according to the deficient knowledge of the last century. As a consequence of this, the junction of the Sierras Amambay, Mbaracayu, and Urucuty is fixed to the west of long. 56° , and there is a proportional displacement of the adjacent valleys;

* (1) *Revue de Paraguay*, 1888, No. V.

(2) Mem. on the length of arc of lat. 24° between the Paraguay and Parana.

(3) Report made to the Academy of Science of Paraguay.

but after the journeys of Johnston and Toeppen it became clear beyond doubt that this point of junction lies considerably further to the east, an observation which my own survey enables me to corroborate.

The misconception as to the actual position of the Salto de Guayra, together with the total lack of information about the region between the Parana and the Sierras Urucuty and Caaguazu, has entailed the result that, in attempting to maintain the cordilleras and the Salto respectively in their due positions, the valley of the Parana must be encroached upon to such a degree as to reduce it to a mere strip, which in no wise corresponds with the reality. The errors, which would have at least been partially avoided by consulting the map of the Boundary Commission of 1874, ought not to re-appear in maps of a date subsequent to my researches.

From the Salto de Guayra the Parana flows almost in a direct line S.S.W., as far as lat. 27° , where it deflects due W. until it is joined by the Paraguay at Las Tres Bocas in lat. $27^{\circ} 17'$ S. and long. $58^{\circ} 30'$ W.

Downwards from this point the river again flows southward, and is known as the Lower Parana.

It has been noticed already that the river in its middle course has a character in very remarkable contrast to what it bears both above and below. In its upper and lower channels it is wide, calm, and navigable, its stream passing in full flow through plains of little elevation, and following without let or hindrance the well-defined limits marked out by the extensive depressions in its bed.

Altogether in contrast with this, the Central Parana is a violent torrent, compressed in its boundaries, subject to sudden risings, and rushing for full 400 miles over rocky shoals and rapids. It constitutes a huge irregularity in the midway progress of the river, presenting an insuperable barrier to all access to the Upper Parana. Investigation of the conformation of the land adjacent to the river, and of the rocks from whence the great cataract issues, has enabled me to account for the phenomena which have effected the sudden change in the character of the water-course. At the period of the formation of the

Sierra Amambay, immense "faults," on either side and parallel to its axis, occurred, which cleft asunder the rocks, severing them so as to open two separate channels, in one of which was to flow the Parana, and in the other the Paraguay; but a later disturbance intervened, upheaving the transversal sierras which crossed the depression of the Parana at about lat. 24° , and originated the Sierra Mbaracayu. Through this the river had to force its passage, effecting an outlet for itself on the western side of the original depression. This is the cataract of Guayra. Once disturbed in its bed, and made to deviate from its course within its rocky boundaries, it had to force for itself a new passage through a region dislocated by the recent convulsions. The vast bed of red sandstone, upon which the waters were precipitated from the height, was worn through by their violence, and the force of the current at the present time makes it quite easy to conceive how the torrent, overcoming whatever resistance it might find, would hollow out for itself a channel of exceeding depth, corresponding in many ways with the cañons of Colorado. Such is the intensity with which the waters still rush onward that they are generally found to have worked down their level to a depth of 120 or 150 feet below the cliffs that enclose them. From this it results that nearly all the affluents that have not succeeded like the main-stream in ploughing their way through the sandstone have to descend into it by falling the entire height of the banks. Sometimes the cascades are close to the river, at other times they are at some distance away, according to the character of the erosions to which the valley has been exposed; the streams, however, are all so closely obstructed by natural barriers, that not one of them is available for navigation.

Forcing its way onward to regain its proper bed, the Parana flows from N.N.E. to S.S.W. for a distance of 3 degrees, and on reaching lat. 27° it is confronted by a fresh obstacle of the same kind as that above. This is the Sierra dos Misiones. But by this time the flood has exhausted its energy in overcoming whirlpools and rapids; the vehement impulse that was communicated at the Salto de Guayra is found to be well-nigh spent, and no momentum is left to contend with the mountain

range. On the farther side of the sierra the waters in the once deserted basin have collected in the stream that is known as the Uruguay; meanwhile the Parana is diverted to the west, where the soil is of a more yielding character. Further on, in long. $56^{\circ} 40'$, another obstacle presents itself, which has to be overcome—the central sierra having thrown out a spur, the off-shoot of the cordilleras Amambay and Villa Rica. A last effort seems demanded; a passage is cleared at the rapids of Aipe (called the Salto Chico by the people of the country), and arriving at an inclined plane, the river is projected without further disturbance to the depression of the Paraguay, which it joins in long. $58^{\circ} 40' W$.

The struggle of the Parana with the rocks is now over. Reinforced by the waters of the Paraguay, which has now become its tributary, the broad stream flows calmly through the plains of Chaco, and, once more turning to the south, mingles its flood in the La Plata with the minor stream of the Uruguay, which, except for the projection of the Sierra dos Misiones, would have been merely one of its affluents.

Obviously, from a geological point of view, it is the middle section of the Parana that is the most interesting part of the river; and still more might be said with regard to the beauties of its scenery.

Hitherto but very few people have surveyed the wonders of its majestic banks. The difficulties of the journey, the deficiency of available means of transport, the terror with which the roar of the whirlpools and rapids has filled the untutored minds of the adjacent population, and the reputed ferocity of the Tupys Indians who congregate there, have all combined to arrest the approach of travellers. Traditions are perpetuated relating the most appalling stories concerning the early conquerors, and the Parana remains comparatively unvisited. It may be deemed strange that, while the whole world is familiar with the name of the Falls of Niagara, so few have ever heard of the Salto de Guayra, that marvellous cataract of South America, the scene where one of the mightiest rivers in the world precipitates itself into an unfathomable abyss. The renowned Spanish traveller, Feliz de Azara, who spent twenty

years in exploring South America, has written an account of the giant phenomenon, which has been quoted as authoritative by more recent writers ; but, as a matter of fact, Azara only reproduced the description given by the Boundary Commission of 1788, colouring it with some of the imaginary tales of the Indians ; consequently, although he is scrupulously accurate to the best of his power, he has in this instance been involuntarily led into some degree of exaggeration. No later delineation of the cataract has been given, except that which was published in 1861 by Lieut. Patiño, of the Paraguayan army. He was sent by Lopez to make a survey, and by way of report he transcribed his journal, every page of which attests his unquestioned veracity : a soldier with an allotted duty to perform, he noted down facts literally as he saw them. It was unfortunate, however, that Patiño contented himself with merely reaching the base of the cataract. He had received his orders to go there, and at the cost of much hardship he obeyed ; but having once caught sight of the rapids, he concluded that he had fulfilled his instructions, and started back to Asuncion the same evening. The consequence of this was to make his account of the Fall most meagre as to details, and failing entirely to convey any idea of its grandeur.

In my own account of my journey of 1887, I have written so detailed a description of the Salto that I need not again repeat it. It may suffice here to say that above the great cataract the Parana expands into a huge lake, between 4 and 5 miles wide, whence it issues in two branches. The waters, in united strength, having forced a breach in the range of hills running from the Sierra Mbaracayu, have formed channels by which they continue to escape. Here the rapids begin. Traversing slightly inclined planes, the waters gather themselves in circular eddies, whence they flow in falls varying from 50 feet to 60 feet in depth ; these circular eddies, which are quite independent of each other, range along an arc of about two miles in its stretch ; they are detached, like giant cauldrons yawning unexpectedly at one's feet, in which the flood seethes with incredible fury : every one of these has opened for itself a narrow orifice in the rock, through which, like a stone from a sling, the water is

hurled into the central whirlpool. The width of these outlets rarely exceeds 15 yards, but their depth cannot be estimated. They all empty themselves into one immense central chamber, about 200 feet wide, rushing into it with astounding velocity.

The channel is the only portion of the falls that can be seen by travellers approaching them from below, and it formed the leading feature in Azara's description. A more imposing spectacle can scarcely be conceived, and I doubt whether abysses such as these exist elsewhere in the world ; but I must hesitate to go as far as Azara in avowing that the earth all around trembles beneath the feet, or that the vapours that rise amidst the whirlpools descend in incessant rain. As for the noise produced by the cataract, I could not observe it at any great distance ; even at the edge of the channel it was quite possible to hold a conversation, and, notwithstanding Azara's fears, neither I nor my companions found ourselves deafened by the uproar. Were misunderstandings cleared away, and the difficulties of travelling overcome, I see no reason why the Falls of Guayra should not attract visitors as much as the Falls of Niagara.

The Central Parana has a large number of affluents, the mountainous character of the district through which it passes not allowing any body of water to collect in minor basins of much importance. The direction of the hills is nearly always at right angles to that of the river, so that these affluents are forced into courses which carry them direct into the main stream.

That which may rank as the most important is on the left shore, forming the boundary between Brazil and the Argentine Republic ; it is called the Rio-y-Guazu (the great river), and is likewise known by the Brazilians as the Rio Grande du Curitiba. It is asserted that Alvar Nuñez (Cabeza de Vaca), one of the most celebrated amongst the adventurers at the conquest of the new world, made his way along its course across the continent from the Atlantic to Asuncion.

According to the figures given by the Boundary Commission of 1874, the Y-Guaza joins the Parana in long. $54^{\circ} 33' 8''$ W., and in lat. $25^{\circ} 35' 28''$ S. About 6 miles from its mouth

its course is broken by the Salto Victoria, no mean rival to many other fine cataracts ; of course it does not offer the same imposing aspect as the prodigious abysses of the Guayra, the river being of such inferior volume to the gigantic Parana, but the height of the falls is greater, being estimated at little less than 200 feet, while as they are all confined within an area of a few hundred yards, they may be seen simultaneously, thus affording a noble *coup d'œil*. The accompanying engraving of the Salto Victoria is a truthful transcript from a photograph by Messrs. Malmann & Monnier.

Being comparatively easy of access, the fall generally draws some half-dozen tourists every year. A boat, with all necessary provisions for the excursion, can be obtained at the yerbateros' settlement at Tacurupucu, a little higher up the Parana on the Paraguay shore.

North of the Y-Guazu the principal affluents of the Parana on the left are the Yaguay and the San Francisco, the courses of which lie in Brazilian territory, and are undelineated.

To the south, and in the territory of the Argentine Republic, the affluents are the Yassy the Aguaray-Guazu, the Pira-y-Mi and the Pira-y-Guazu, the Parana-y-Guazu, the Parana-y-Mi, and the Jabebiry. It was in the vicinity of some of these that the Jesuits established a number of their principal missions. Nothing of these now remains except some ruins in dense forests, although it may be mentioned that an attempt has been made, under General Roca, to organize in the new Argentine province Los Misiones, some fresh settlements on the very sites that were occupied by the Jesuit community.

The affluents of the Middle Parana on the right, lying within the territory of Paraguay, are much more considerable than those on the left. Such of them as are in the lower part traverse districts that may be described as populous, whilst those in the upper part irrigate rich *yerbales*, a certain proportion of which are already under cultivation, the rest being well-nigh sure, in the general advance of Paraguayan affairs, not to remain unworked for long.

There is very much confusion in the nomenclature of all these various streams. Names have been assigned them by



E. Blon, Nouvel et C^{ie}, Paris.

VICTORIA FALLS ON THE Y-GUAZU

the Jesuits and by the Boundary Commissioners respectively, which by no means coincide. It has even happened that in the case of a contested frontier the exigencies of the moment have induced a competent commission knowingly to acquiesce in what was erroneous, thus stereotyping a misconception. For instance, the first affluent below the Salto Guayra has been designated the Garey, the Igurey, or the Piraty-Y, according as there has been the disposition or not to identify it with the Igurey-Money, a river indicated in the treaty made in 1750 between Spain and Portugal, but which really flows into the Upper Parana above the Amambay in lat. 25°. Acting upon the representation of the Boundary Commission of 1874, we may now accept its denomination as the Piraty-Y. It has a certain interest attaching to it as skirting the southern side of the Sierra Mbaracayu, and carrying down in its loose soil traces of a mineral wealth which probably exists in the unexplored regions from which it descends. Its sources would appear to be about lat. 24°. It is not navigable.

The river, for which we may retain the name of the Igurey, joins the Parana about 30 miles from the Guayra Falls. On many maps it is marked as the Rio Pelotas. It rises in the extreme west of the Sierra Mbaracayu, at the foot of a mountain to which the yerbateros give the name of the Cerro Nogués. In my map it is placed in long. 55° 13' 15" W. and lat. 24° 2' 10" S. It issues originally from two lagoons a little to the north of lat. 24°, in the yerbales known as the Rancho Carapa. Toeppen, when he was making his journey up the Aguaray-Guazu, passed near the lagoons, but he was unable to ascertain what was the direction of the current. In 1887 Mons. G. Du Bois Du Tilleul came to the conclusion that they gave birth to the Arroyo Carapa, which, as a matter of fact, is simply the upper part of the Igurey. The entire length of the river may be taken as somewhat over 70 miles. It was partially explored also in 1887 by M. Ladouce, who found that it was navigable for about 20 miles above the cataract that obstructs its course 9 miles from its junction with the Parana. The valley through which it flows is narrow and thickly wooded; on the south it is bounded by a plateau

sloping towards the valley of the Jejuy-Mi and Jejuy-Guazu, both affluents of the Paraguay. All about here the hills are sharply defined, and form the connecting link between the great Central Sierra of Paraguay and the Sierra Amambay.

About 8 miles below the mouth of the Igurey we find the mouth of the Rio Pozuelos. On Mouchez' map this river is made to appear of much greater importance than the Igurey; in all other maps it is represented as altogether inferior. In the absence of experimental knowledge, it is manifestly impossible to give any decisive opinion on the point; but, as it is beyond dispute that the central cordillera at the presumed position of the sources of the stream takes a S.W. direction, it seems no unreasonable inference that the length of the Rio Pozuelos must not be far short of that of the Igurey.

Much the same may be said with respect to the Itaimbé Guazu, Iacanguazu, Santa Theresa, and Ibiturocay, which are quite unknown in the lower part of their courses. Near their sources, on the contrary, they are taken possession of by the yerbateros, who cultivate large tracts of land upon their banks. For years past the yerbateros, under Major Pacifico de Vargas, have been working on the borders of the Santa Theresa and the Ibiturocay; but, as they have not pushed their labours far inland, the information they can give is very limited, and goes little beyond the statement that the district is inhabited by an interesting Indian tribe, of quiet, inoffensive habits, which has been visited by Lieut. Patifio and M. Ladouce. The probability is that both these rivers are navigable above the falls that divide them from the Parana.

Just at this point the Parana valley is parted into two divisions by an offshoot of the Central Sierra, which takes a S.E. direction. The eastern section includes some little rivers, as the Itabo, the Pindayguy, and the Tatiupó; the western supplies affluents for the Acaray, which is one of the Parana's most important tributaries.

The map may be trusted to exhibit further hydrographical characteristics, and will allow me to refrain from entering more minutely into these dry details.

CHAPTER IV.

THE BASIN OF THE PARAGUAY.

As sete lagoas—Communication between the basins of the Paraguay and of the Amazon—Descalvado—Lake Xareyes—The Cuyaba—The San Lorenzo—Corumba—The Bolivian question—M. Thouar—Suarez Arana and Calvimontes—Fuerté Olympo—The Pan de Azucar—Las Siete Puntas.

ALTHOUGH the Paraguay is an affluent of the Parana, it has an importance of its own, which raises it to an equality with the great river into which it flows ; and for the population of South America it may be said to bear a relation corresponding with that of the Missouri to the Mississippi in the United States.

We have already seen how the depression of the Paraguay follows a direct course from lat. 14° to lat. 35° , and although in lat. 37° the Parana comes into possession, it may be said only to usurp the bed of its rival. Up to this point the Paraguay has played the leading part. Of great depth, well embedded within its banks, unvarying in its current and velocity, and containing a vast volume of water at all seasons, it can always be navigated by the largest vessels, so that the American trade can be carried by its means into the very heart of the continent. Neither the Parana nor the Amazon, nor any other of the great rivers, is capable of rendering service so large as this.

In his well-known "Expédition dans les parties centrales de l'Amérique du Sud," M. de Castelnau has recorded that the Rio Paraguay has its source in lat. $14^{\circ} 35' S.$, and long $56^{\circ} 10' W.$, at a place called *As sete lagoas*, situated about 1,000 feet above the level of the sea.

The plateau, which is of no great elevation, is part of the Central Sierra of America, and forms the watershed of the basins of the Parana and the Amazon. It is overlooked by the two mountain ridges of Tomador and Tamandua, which

connect it on the east with the Sierra Azul, and on the west with the Sierra Paresis.

Some writers say that the Rio Arinos, a tributary of the Tapajos, one of the principal affluents of the Amazon, has its source on the same plateau, and in the same lagoons as the Paraguay. At the beginning of its course the Paraguay, being augmented by the waters of the Santa Ana and the Tamandua, flows due south. In lat. $15^{\circ} 45'$ it receives on its right hand bank the Sepotaba, and in lat. 16° the Cabacal, at the spot where stands the town of San Luis de Caceres, which was formerly known as Villa Maria. About 40 miles lower down it is joined by the Jauru, which flows from the west. One of the affluents of the Jauru, the Aguapey, has the same source as the Alegre, which unites itself with the Guaporé, an affluent of the Amazon. For some time the scheme has been mooted that these streams might be converted into a river-highway connecting the basins of the Amazon and the Parana, but the rapids of Mamoré and Madura appear to render the conception visionary.

Although at this height the Paraguay flows through the Brazilian province of Matto Grosso, a region lying outside the proper scope of this volume, I deem it well to enter into some of these geographical details for two reasons: first, because so many writers have published accounts which are far from accurate; and secondly, because it is with specific reference to these particulars that sooner or later the projected scheme will have to be promoted of establishing communication between the immense southern and central territories of South America.

Having passed the Bahia de las Piedras, where it is joined by the Jauru, the Paraguay is deflected westward by a chain of mountains, of which the Morro de Caforo forms a part. On the left it takes up the Rio Novo, on the bank of which has been erected M. Cibils' great factory—Descalvado, at which the condensed soups, for which there is so large demand in England, are prepared.

Legends that refer to the geographical record of this spot are numerous, but not to be trusted. When the Spanish con-

querors first pushed their way thus far, their progress, they are alleged to have declared, was arrested by an immense lagoon, to which they gave the name of Laguna de los Xareyes. This they represented as the source of the Paraguay, and invested it with marvellous properties, maintaining that in its centre was situated the great El Dorado that was the dream and stimulus of the adventurers who set forth to explore the New World. Their statements so prevailed that the Laguna de los Xareyes was recognised by subsequent writers on this part of America, and it was assigned a place on every map. Unfortunately, the lagoon never existed.

It is just probable that those intruders may have made their advance to the Upper Paraguay at a season of heavy flood, when the adjacent vicinity was inundated, as is still not unfrequently the case, and thus there might be a pretext for the error; but in reality there are only a few unimportant marshes, through which the river-channel proceeds in a course that is well defined, the banks for a considerable distance being sufficiently high above the stream to preclude any fear of their being submerged. Such is the site that has been selected for Descalvado.

Some distance lower down on the right, two deep-sunk lakes open into the river, one known as Uberava, the other as Gayba; and just below these, in lat. 18°, the largest of all the left-hand affluents, the San Lorenzo, pours in its stream.

At present very little can be said to be known about the San Lorenzo; only in its lower course has it been scientifically explored. It admits of being ascended by small steamers, but these proceed no further than the Rio Cuyaba, an affluent on the right-hand bank, which leads to a town of the same name, the capital of the Brazilian Province of Matto Grosso. A little higher up is Diamantino, a small town, now almost deserted. According to some observations made by Vogel in 1888, not published, but communicated to me by Dr. Morsbach, Cuyaba is situated about 600 feet above sea level. Pontes y Laxerde places it in lat. 15° 37' and long. 54° 7', which is an indication of the slightness of the decline of the Paraguay-Parana basin.

Below the mouth of the San Lorenzo, on the right hand, is the Laguna Mandiory, and beyond that the important chain of hills which includes the Pan d'Amolar, Los Durados, and the Chanes. Making a bend round the mountain range, the river proceeds in a S.W. direction as far as lat. 19°, where it reaches on the right the Laguna de Caceres, near the outlet of which is built the small town of Corumba, with the great Brazilian arsenal of Ladario a short distance further on.

Some special political interest attaches to this lagoon, inasmuch as here is the sole point of communication between the Republic of Bolivia and the Rio Paraguay. A short time since Bolivia put a custom-house there at a place named Piedra Branca. It is at the end of a bad road leading along the upper frontier of Chaco, as far as the town of Santa Cruz de la Sierra, which lies about 400 miles inland.

Usually the Laguna de Caceres has but little water, and can only be navigated by ships of small draught; indeed, during some months of the year it is by no means an uncommon occurrence that the sailors are obliged to leave their vessels, and get into the water to drag them over the muddy deposit, at the risk of being bitten by the ray-fish, pariñhas, and palometas, with which the lagoon abounds.

The significance of this may be apprehended by reviewing the political situation of Bolivia during the last few years. Formerly the Republic had for its frontier a certain portion of the river Paraguay north of Bahia Negra; but when the idea was started of opening communication with the Amazon by way of the Madeira and Marmoré, Bolivia exchanged with Brazil the territory that she held on the Paraguay for a tract of land upon the Marmoré. At the time the transaction seemed equitable and satisfactory enough, but it subsequently became a matter of extreme regret to the Bolivians. They had failed to realize the impossibility of accomplishing the scheme of intercommunication, and when the disastrous war in Chili had brought about the closing of their ports on the Pacific, they had to discover that, in surrendering their frontier land on the Paraguay, they had deprived themselves of the only outlet by which commerce could be maintained with the outer

world. The bay of Caceres was all that was left them, and this, as we have seen, was not only unfitted for navigation, but was situated in what might be called "the Caudine Forks" of the Brazilian Custom-house at Corumba, which rendered it practically useless.

Such are the circumstances from which originated the claim which the Bolivian Government makes for a part of the territory of Chaco. The claim is utterly indefensible, interfering as it does with the rights of Paraguay. We shall have to revert to this question later on; it has arisen from the anxiety of Bolivia to gain possession of some port of ingress and egress on a navigable river, thus getting deliverance from the imprisonment in which their present frontier confines them amidst the Andes.

After passing Corumba, the Paraguay flows towards the west; it makes numerous curves round about the chains of Rabicho and Pyrepytanga on the right, receives the waters of the Tacuari on the left, and then, turning S.W. in lat. $19^{\circ} 30'$, arrives at the cliffs on which are the ruins of Albuquerque Nuovo. Facing these is the mouth of the Rio Miranda, or Mondego, a navigable affluent on the left, which leads to the little town of Miranda, which has grown up amidst the most luxuriant pasture-lands of Brazil.

On the right hand shore lower down is the fortress of Coimbra, the extreme military outpost of the Brazilians. Near the fort in the mountain side there are some remarkable grottoes, the extent of which has not been accurately ascertained; numberless stalactites hang down from the vaulted roofs, and the pillars assume fantastic shapes, curious as any to be found in caves of world-wide notoriety; it would seem as though it needed but a few poets or enthusiastic tourists to celebrate their wonders, and the grottoes of Coimbra might fairly rival those of Finland.

But a few miles more and the river quits Brazilian for Paraguayan soil, so far, at least, as concerns the right-hand bank. Nearly at lat. 20° and long. 63° is the mouth of the Rio Negro, the northern boundary mark of the Paraguayan possessions in Chaco. Like so many other of these streams, but little is

known of it save at its lower course; it issues from a large lagoon about six miles to the north, known as the Bahia Negra; but although an attempt to survey it was made by Captain Fernandez, of the Argentine army, it is still confounded with the rivers Tucavaca, Otuquis, and Aguas-Calientes.

Distant six miles from Bahia Negra is a settlement which has been the occasion of various demonstrations on the part of the Bolivian and Paraguayan Governments. It was originally called Chamacoco, after the Indians who resided in the locality; it was subsequently named Puerto Pacheco by the Bolivians; now, however, it is simply known as Bahia Negra. The settlement has its position on an elevation about 12 feet above the river, and consists of a number of buildings occupied mainly by the workmen who are engaged in the neighbouring forests, and of the fort garrisoned by Paraguayan troops. Its altitude above the sea, according to Minchin's map, is about 300 feet.

It was in 1884 that M. Suarez Arana, a Bolivian, applied to the Paraguayan Government for leave to establish a settlement here, under the impression that it would serve as a good starting-point for a roadway that should lead across the desert of Chaco to the environs of Sucre. Paraguay acceded to the request, making stipulation that there should be no erection either of a military station or a custom-house.

It was an arduous undertaking. There were marshes to cross and forests to clear; water was scarce, and the resident Indians were unfriendly. Effort upon effort seemed ineffectual. So impressed, however, was Suarez Arana with the value of his design, that in spite of difficulties he persevered resolutely in the task, until he had succeeded in making a picada (or bridle-path) half-way from the coast. He was obliged to stop at the foot of a hill called Cerro San Miguel, marked in Minchin's map in lat. $19^{\circ} 20' S$.

In 1886 M. Arana resigned his post, and the Bolivian Government entrusted his project to M. Thouar, a Frenchman, who had already once crossed the Chaco in search of the remains of Dr. Crevaux. The enterprise again failed of success. M. Thouar came to the conclusion that no passage could be made at that latitude; he went so far as to deny the



E. Blou, Xournal et C., Paris

ON THE BANKS OF THE RIO PARAGUAY

existence of the Cerro San Miguel, and refusing to make any further effort in that direction, he led his party some distance to the south, and thence endeavoured to reach the Pilcomayo. The adventure proved most disastrous. M. Thouar was abandoned by all his party, and narrowly escaped a violent death at the hands of the Indians.*

Some months later the son of M. Suarez Arana and a M. Calvimontes took up afresh the original scheme. They succeeded in reaching the Cerro San Miguel, which certainly existed in spite of M. Thouar's asseverations to the contrary, and persisting in their progress, reached the banks of the Paraguay on May 19th, 1888, thus demonstrating beyond dispute the practicability of the proposed line of communication at about the latitude of 20° S. ;—a fact of significant importance, as it may not improbably bear upon the future development of the region.

All throughout this time Bolivia had had little expectation that the outlet would be found, but now that the picada had been so far accomplished, and that the scheme seemed feasible in consequence of the success of Arana and Calvimontes, the government proceeded to revive their claim to the territory of Chaco. The consequence was, as might be anticipated, the military occupation by Paraguay of the disputed point, in virtue of the right of sovereignty which from time immemorial she had exercised over the soil. This ensued on the 14th of September, 1888.

Forwards, from the mouth of the Rio Negro to the Rio Apa, the general direction of the Paraguay is towards the south, with the Brazilian territory on the left hand and Paraguayan Chaco opposite. As a rule the left shore is about 10 or 12 feet above the stream, the plain of Chaco on the other side being usually quite low, although at intervals there is rising ground to the height of 20 or 25 feet, extending some 60 feet inland. The pilots who ascend the river have given names to the most conspicuous of these plateaux, calling them

* M. Thouar is publishing in the "*Tour du Monde*" an account of this expedition, entitled, "*Voyage dans le Chaco borbéal.*"

successively the Barrancas of Cabeza de Buey, Campos Quemados, Murandas, and Rabo d'Ema. Opposite the last is the mouth of the Nabileque, on the left-hand bank.

According to the statement of one of the residents in Corumba, which, however, I only accept with reserve, the Nabileque is not a river at all, but only an arm of the Paraguay, of which the other end is found at a short distance above the fortress of Coimbra. It is said that during the war, when Lopez despatched his fleet up the main stream with the design of surprising the settlement, some Cadjuevos Indians, whose sympathies were with the allies, started up this supposed river in their canoes, reached Coimbra before the warships, and gave warning of the impending attack.

Below the Nabileque, also on the left bank, is the Rio Branco, which flows down from the central cordillera. About two miles lower on the right, in lat. 21°, is Fuerte Olympo, formerly called Fuerte Borbon, a settlement established in 1792 by the Government of Paraguay; the eminence on which it stands is part of a mountain chain known as Las Tres Hermanas, and consisting of six hills, of which the most northerly is separated from Fuerte Olympo by a lagoon, and bears the name of Cerro del Norte. The country all about this important outpost is sufficiently elevated to be above the reach of floods, and is perfectly fit for cultivation. Opposite, on the Brazilian side, M. Malheiro has established a large cattle-ranch, where some very fine beasts are bred. The growing crops, however, belonging to the estate are on the Paraguay side, within the territory of Chaco.

This arrangement seems generally adopted hereabouts; and I found that both M. Barros and M. Boaventura, who have estates lower down on the Brazilian shore, spoke of the superiority of the Chaco soil for cereals—a condition which augurs well for future colonization.

As the river flows southward, its banks become higher. Beyond the mouth of the Rio Tereré, a conspicuous mountain chain attracts the eye, to which the Brazilians have given the name of Fecho dos Moros. It forms a portion of that secondary network of broken hills of which we have already spoken,

and composed as it is of a nucleus of hard syenite, it has resisted the erosive influence which has worn away such a large part of the Cordilleras. Amongst these hills the great river makes many windings: one place there is in which it expands into a sheet of water more than half a mile in breadth, and, being apparently quite enclosed, it suggests comparison with one of the beautiful hidden lakes of the Pyrenees.

Towering above the rest of the range to the north is an imposing peak, so regular in its conical form as to be precisely like a sugar-loaf. The Spanish invaders at once gave it the name of the Pan de Azucar, and it has always remained prominent in the annals of the locality. It has been the starting-place of most of the expeditions from Paraguay to Peru, one of these being the expedition of Irala in 1547. Mouchez estimates the height of the Pan de Azucar as about 1200 feet, but I do not know whence he derived this measurement, and I was unable to verify it, because at the period in my journey when I was there I was suffering from the wound I had received in Corumba, and was unable to make the ascent.

In 1887, the officers of the Brazilian navy made various observations, but the result of these has hitherto been unpublished.

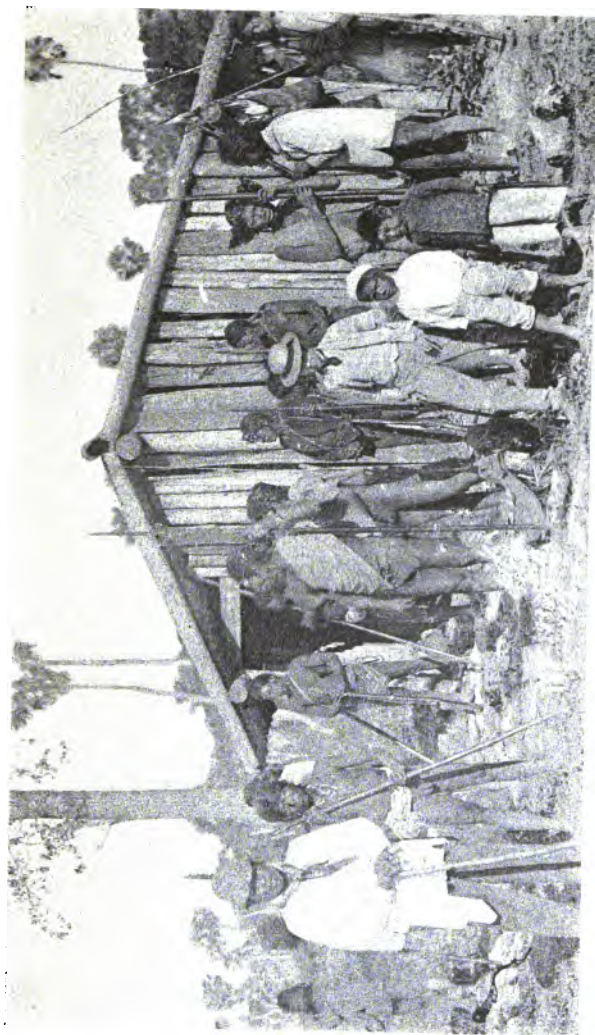
The height and situation of the hill unite in making it one of the best strategical positions in this part of the river, and it was the claim to its possession that entailed the prolonged dispute between Paraguay and Brazil, pending the settlement of the boundary question. According as the Rio Branco or the Rio Apa should be adjudged the frontier, the Fecho dos Moros would accrue to one power or to the other, inasmuch as the entire range, except one solitary peak, lies on the left hand bank.

The contention was finally settled in favour of Brazil.

Leaving this range behind, the Paraguay next makes a bend to the east. It becomes narrower, and, at a point that is known as the Paso de Taruma, is somewhat difficult for navigation. It is here that M. Barros and M. Boaventura have the estates to which reference has been made.

About 40 miles below the Pan de Azucar, but on the Chaco side of the river, is another group of hills—Las Siete Puntas. Nearly facing this is the mouth of the Tepoty, the last affluent that the Paraguay receives before reaching the Apa, 36 miles lower down. A forest farm has recently been started on the left, a few miles above the Apa. It has been called Colonia Formosa, and not improbably may become the centre for an increasing population.

Lieut. Page reckons the distance from Bahia Negra to the Rio Apa to be about 192 miles. The land adjacent to the river is richly wooded, and all adapted for cultivation. As yet the country is overrun by Indians, some of whom are very ferocious; those on the left hand shore belong to the Cadjuevos tribe; on the left are the Chamacocos, the Angaites, and the Sanapanas. The last of these are gradually softening down and beginning to work in the enclosures; the Chamacocos retain their warlike instincts, and are perpetually engaged in internecine strife.



E. Plon, Nouvel et Cie, Paris.

SANAPANÁ INDIANS

(View taken in Charo, near the Rio Apa)

CHAPTER V.

THE BASIN OF THE PARAGUAY (CONTINUED).

The Rio Branco and the Rio Apa—Itapucu Guazu—Puerto Casado—San Salvador—Villa Concepcion—Rosario—The affluents—The Apa—The Aquidaban—The Ypane—The Jejuy—The Tibicuary—The Pilcomayo.

HISTORICALLY, the mouth of the Rio Apa constitutes one of the most important points in the geography of Paraguay. From the close of last century down to quite a recent date, the determination of its true position has been a theme for discussion by successive boundary commissions.

The government of Spain never failed to claim against Portugal its title to the sovereignty of the land north of the river. Paraguay, when independent, continued the struggle, and insisted upon the rational interpretation of the Treaty of St. Ildefonso, which fixed the boundary at the Rio Blanco; but after the war of the Triple Alliance it was the Brazilian interpretation of the treaty that was accepted, and the Rio Apa was definitely declared to be the northern frontier of Paraguay.

The latitude of the river-bar has often been taken; but the result has varied from lat. $22^{\circ} 2'$, given by Fr. Quiroga, to $22^{\circ} 6'$, assigned by M. Leverger. Admiral Mouchez, on whom reliance should be placed, places it in $22^{\circ} 5' 8''$.*

As to its longitudes, there are but three known estimates—that of Page, who gives $58^{\circ} 15'$; that of Mouchez, who gives $57^{\circ} 58' 7''$; and that of the 1874 Commission, which is $57^{\circ} 58' 36''$. The map published by Nolte places the river-mouth in long. $58^{\circ} 2'$, but I am not aware on what authority.

A Brazilian colony cultivates the fertile soil at the mouth of the stream, and opposite to this stands a Paraguayan outpost called Confluencia, which guards the frontier.

* Other reckonings that are given are—Pasos, $22^{\circ} 3'$; Azara, $22^{\circ} 4'$; Boundary Commission, 1874, $22^{\circ} 4' 45''$ ·24; Demersay, $29^{\circ} 3' 30''$.

Below the Rio Apa the navigation of the Paraguay becomes somewhat impeded by rocks and sandbanks. It would seem as if between lat. 22° and lat. 23° the river has been diverted from its original channel, and, forcing itself on among the hills on the left, has deviated for a while from the lowlands of the Chaco. All along this part the unevenness of the ground on both sides of the river is very noticeable; here, too, the outlying and detached spurs of the Sierra Amambay are found across the river, losing themselves in gradual descents in the Chaco plains.

The scenery hereabouts is very picturesque. The tall cliffs of grey marble are hollowed out into grottoes, sometimes parallel with the bank, and sometimes running inland along the edge of some deserted arm of the stream, which has widened itself out almost to become a lake; these are all full of animation from such teeming flocks of birds as Paraguay alone can show. Giant cactuses and towering tree-ferns cling to every projection on the face of the marble, redeeming it completely from its native bareness. The horizon is bounded by lofty hills, which for the most part are thickly wooded, and at certain seasons are clothed with flowers of exquisite hue; in one place the lapacho, with its blossoms like great clusters of violets, predominating; in another, the brilliant yellow of the paratodo overpowering the less conspicuous blooms below. All the way from Itapuca-Guazu to the vicinity of the ancient town of Divino Salvador is a scene of perpetual enchantment.

Several stations have been planted in this locality, and a visitor would be well accommodated.

Beyond the cliffs of Itapuca-Guazu, opposite the Monte Colony, is what was the fortress of Francia, and six miles lower down is Puerto Casado, whence can be seen the heights of the Cerros Moradas, which form the extreme spur of the Quinze Puntas on the left bank of the river. Since the war a settlement has been established at the foot of these hills, which, after bearing the names of Santa Maria del Apa and Colonia Francia, is now known as the Colonia Morada de Risso. A variety of excursions may be made from this spot; hunting expeditions may also be undertaken, as huge jaguars, or American tigers, abound in the woods.

A little lower down an island lies mid-stream, and on the shore are the rocks of Peña hermosa; below these are the fantastic grottoes of Piedras Partidas, and then the *passo* of Itapuca-mi is reached; after which the banks are again low, and the scenery over the plains resumes its monotonous aspect; not that the navigation of the river can be considered safe until the somewhat dangerous reach at Los Arrecifes has been passed.

On the Chaco side, a little further on, and only a few miles from San Salvador, is the colony of San Carlos. This, previous to the war, was the site of a flourishing town; nothing, however, now remains but the church, which is intact, and the ruins of the barracks.

In lat. $23^{\circ} 10' 50''$ (according to Mouchez) is the mouth of the river Aquidaban, and in lat. $23^{\circ} 23' 56''$ (according to Page) is Villa Concepcion, one of the most important towns in Paraguay. A large island extends to the mouth of the Ypané, which is about six miles from the town.

There is little that demands notice in the further course of the river until it reaches the northern mouth of the Jejuy, in about lat. $24^{\circ} 12' S.$, and long. $57^{\circ} 20' W.$ The river has two arms, of which the smaller lies a little to the south. Below Villa Concepcion the banks of the river are high on the left, those on the Chaco side being quite low; the channel is well defined, and the stream flows through it so uniformly that all shipping proceeds without hindrance. Two miles to the south of the Jejuy is a small military station called Barranquerita. All steamers stop at this place, which is the starting-point of the road to San Pedro on the Jejuy.

Between Barranquerita and the port for the town of Rosario there is passed the little river Yeteti, opposite to which is the mouth of the Aragua-y-Guaza, said to be a branch of the Pilcomayo. The expedition of Capt. Fernandez was lost here in 1886.

The *puerto* has been placed on an elevated *barranca*, about three miles from the town, which it is designed to serve, and from which it is separated by some troublesome marshes. Rosario, however, may be reached by ascending the Quarepoty, although the current of the little river is occasionally so strong as to make stiff work for the boatmen.

Formerly some prosperous estates existed just below Rosario, of which M. du Graty has written an account. Since the war they have been abandoned ; but the population is beginning to return, and before very long the locality will most likely be as flourishing as ever.

From the Paraguay side the small rivers Tapiracuay and Capiipobo next make their contributions to the main stream, after which, in about lat. 25°, the Manduvira comes in sight, at the debouchment of which lies the large estancia of Olivares. On the shore is a little chapel erected in the time of Lopez, who intended to build there a town.

The voyager down the Paraguay will now have to pass the Piribebuy, then the Salado, which issues from the Laguna Ipacaray, and then will have to double the cluster of rocks known as the Peñon, which presents a fantastic barrier in the stream. He will notice Villa Hayes, a Chaco colony formerly called New Bordeaux ; he will cross the mouth of the Rio Confuso, which after a devious course pours into the Paraguay waters briny as the sea itself, and then, leaving on the right the island of San Francisco, the Surubi-y, the Remanso Castillo, and the church of La Trinidad, he will find himself in the Bay of Asuncion, and catch sight of the town lying peacefully on the green hillsides of Mangrullo and Recoleta.

Below Asuncion the Paraguay has, on the left, tall cliffs of red sandstone, which occasionally, as at Itapytapunta, rise to a height of nearly 100 feet above the river ; it next flows over a low-lying tract, which in flood-time becomes a lake reaching right away to the foot of the basaltic mound of Tacumbu, not far from which is the Cerro de Lambaré, its green summit visible from a long distance. On the opposite Chaco side meanders the Rio Pilcomayo, a peculiar river, gliding gently along amidst abundant water-lilies. It has a melancholy history, to which I shall refer in describing the affluents of the Paraguay. It is now the boundary between the Paraguayan and Argentine Chacos, the right bank being Argentine, with the blue and white banners of the Confederation floating without interruption to the extreme point of Tierra del Fuego.

The banks beyond the Cerro de Lambaré are very fertile,

and, on the Paraguayan side, well populated. At every turn, half hidden by their orange groves, are attractive little villages such as San Antonio, Ypané, Villeta, Angostura, Les Palmas, Mercedes, and Villafranca, whence large consignments of fruit are sent to Buenos Ayres.

In lat. $26^{\circ} 35'$ the Paraguay is joined by the Tibicuary, one of its more important affluents; it flows onward past Villa del Pilar opposite to the Chaco river Vermejo, and the fortress of Humaita, which, for the space of three years holding the allied armies at bay, gained a notoriety in the annals of South America.

In lat. $27^{\circ} 15' 32''$ the Paraguay and the Parana unite their strength, the point of confluence being known as Las Tres Bocas.

Hitherto I have scarcely done more than mention the names of the various affluents of the great river: they are all interesting and worthy of more minute description than our limits can permit; but as so little is known about them, I conceive that it may not be out of place if I introduce some few details concerning those at least which are on the Paraguayan side.

First of all, however, it may be stated that the inflowing streams from the Chaco side are not numerous, and do not, at any rate at present, seem likely to become of much economic importance. Not only are the difficulties of exploring the country very considerable, but the attempts that have been hitherto made have had no encouraging results. The nature of the surface of the soil is itself an obstacle; it would almost seem to be still in formation; it lies very low, except in a few isolated spots, and consequently is perpetually exposed at flood-time to vast inundations, which, from the levelness of the land, cannot flow back, so that the soil is only relieved of its superabundant moisture by the slow process of evaporation. The limited number of the outflowing rivers is a confirmation of this. It might have been expected otherwise: these rivers descend from the snow-capped peaks of the Andes, which, it might be presumed, would keep up a constant supply of water, but as a matter of fact they are meagre and half-stagnant. Undrained, the land is always swampy, the water is so impregnated with salt that it is unfit to drink, and the rivers continually degenerate into miry marshes, over which no boat can

make its way. Thus every expedition becomes a failure. This description applies to one and all of the right hand affluents from the Rio Negro to the Confuso, and even the Pilcomayo beyond makes no exception to the rule.

We turn, then, to the affluents on the other shore: and first, as to the Rio Apa, the northern boundary-mark of Paraguay. Until the last few years the course of this river has been hardly known: by Dr. Rengger and others it has been confused with the Rio Corrientes, and commissioners, arbitrating between Spain and Portugal, were content to foster the uncertainty. All room for debate, however, is now at an end; the inquiries of the Paraguayan and Brazilian Commission of 1872 resulted in a definite settlement of all ambiguity. Yet although there might be some scientific doubts existing, even in the time of Lopez the course of the river was known well enough to the natives for all practical purposes. Military stations were built and farm estates were established along its banks: and when Col. du Graty was travelling over the country in 1858, he found access was quite easy to Olivia, Julian-cue, Bareiro Saigu, Itacui, San Carlos, and all the villages which the Government had planted there.

Deserted now are all these places since the war, but no difficulty would be found in starting fresh and prosperous colonies. Already a scheme has been proposed for the construction of a railway having its terminus at the river. The result of surveying, anyhow, has been the production of a map which is trustworthy. It is as yet unpublished, but I have been able to avail myself of it for the northern portion of my own map of Paraguay.

The Apa rises in the Sierra Amambay, in lat. 22° S. At first it flows due east, receiving on the left the Rio Estrella, which was regarded by the Commission as the deepest of all the Apa's source-springs, and for that reason was adopted as the most easterly part of the north frontier between Paraguay and Brazil. It was an award entirely at variance with the spirit of the treaty of St. Ildefonse, and deprived Paraguay of a considerable stretch of territory.

Rising in the Sierra Amambay, in lat. $22^{\circ} 16'$, and long.

55° 49', between the two Brazilian stations—Dois Dorados and Punta Pona—it crosses the yerbales of Tacuru Pyta, not being navigable.

Nor is the Apa navigable; it is broken by too many rapids; it flows through an undulating limestone district, abounding in marble quarries that are quite within reach. Its valley is quite narrow. On the south it is bounded by the Sierra de las Quinze Puntas, which runs east and west parallel to it at a distance of about 20 miles, various small streams, such as the Apa-rui and the Blanden-cue, flowing into it from this side. On the Brazilian side, the hills, except the Cerro Margarita and the Cerros Galvan, near the mouth, have an inconsiderable altitude, the river bank rapidly merging into a vast plain that stretches as far as the Rabicho range, near Corumba. At its union with the Paraguay, the mouth of the Apa is obstructed by a bar of sand, which makes approach difficult; there is likewise a small island that divides the stream into two arms, the lower one of which is usually dry during very hot seasons.

Another important tributary of the Paraguay is the Aquidaban, formerly called the Aquidabanigui. Like the Apa, it rises in the Cordillera Amambay a little above Punta Pona, at about lat. 22° 15'. At its earlier course it flows to the W.S.W., but after receiving the Arroyo Negla it proceeds due west, until it reaches the main stream about 15 miles to the north of Villa Concepcion. In its upper course it bounds the yerbales of Chiribuelo; it then passes below Cerro Cora, the mountain at the foot of which Lopez met his death, and, after skirting the Cerro Sarambi and taking up the water of the Negla, it meanders on through rich pasturages and concessions. Although with regard to its volume it must be reckoned as one of the largest of the affluents of the Paraguay, it cannot be said to have much commercial importance, the rocky nature of its bed causing so many perilous rapids, that the yerbateros who work in the forest have abandoned all efforts to utilize it for traffic, preferring the safety of the long and tedious land-route for conveying the yerba-maté to Villa Concepcion. It is impossible as yet to say what may be achieved in the future to overcome

the difficulty of the cataracts, so that the river may be available for the transport of the timber of the magnificent forests through which it passes. I had not the opportunity of seeing for myself, but I was informed that some of the finest specimens of wood in all Paraguay are found there, and that trees are quite common from 60 to 90 feet in height, and exceeding 6 feet in diameter. Down in the plain of Concepcion the Aquidaban has steep banks, until it receives, on the right, the little tributary known as the Pytarogo, about 30 miles from its mouth.

The Rio Ypané is the next in order of these affluents. Its general direction is almost parallel to the Aquidaban, at an average distance of 25 miles further south. It differs from the Aquidaban in being navigable, although its bed is not deep enough to allow trading-vessels to proceed except during the seasons when its water is at the highest. Half-way along its course it is joined on the south by the Guaza, which, like itself, originates in the Sierra Amambay, and has a channel sufficiently deep always to permit of navigation.

The fertility of its confines is wonderful, and the district cannot fail to become a centre of colonization. It is now frequented by the *chateros* for the transport of the yerba-maté.

But of all the interior rios of Paraguay the Rio Jejuy is indubitably the most important. Even the Tibicuary must be accounted subordinate, by reason of its marshy surroundings and incessant windings, which interfere with all regular traffic; and while the Apa, the Aquidaban, and the Ypané are all limited to comparatively narrow valleys, the Jejuy, with its many tributaries, drains an area not much short of a fourth of the whole surface of Paraguay. It may be compared to a giant tree-trunk, the ramifications of which stretch far away, its remotest limits to the west being found where the Sierra Amambay and the Sierra Mbaracayu unite, other branches reaching in their several directions towards San Joaquin, San Estanislao, and the chain of Panadero. The various affluents all converge to the central valley, and combine to make up the fulness of the Jejuy. There can be no doubt that the Jejuy will one of these days attain a considerable importance.

Hitherto it has been known very imperfectly, and the published maps exhibit gross errors. It has been my lot to be the first to explore it thoroughly, and I believe that the map of my journey of 1887 alone affords correct details of its geography.

The commercial value of the river rests upon the navigability not only of its main-stream, but of certain of its affluents; it is this which has opened the way to the magnificent yerbales of the district; these have become well-known, and are being exploited, while those of the Parana valley, owing to the difficulty of approaching them, have remained neglected.

The Jejuy rises in two head-streams in the Cerro Noguez, where the three great cordilleras meet: the northern of these is the Jejuy-mi, the southern the Jejuy-Guazu; after curving northwards and southwards, they join each other in lat. $24^{\circ} 6'$ and long. $55^{\circ} 40'$. The northern stream waters the important yerbales of Pyracay and Villa Ygatimi, receiving several minor streams, one of them named Itanara, on the right; the Jejuy-Guaza traverses the yerbales of Carapa and Vacapara, taking up the Tacuarembay on the right, and the Trapicho-cue on the left. After uniting, the two branches form a little river about 40 yards across, with a current of 3 feet per second and an average depth of 6 feet.

Hence the Jejuy flows for a while N.W., skirting the hill of Las Tres Hermanas and taking up the Rio Paray, which collects the waters of the region between Villa Ygatimi and the Cerro Mbaracayu, generally known as the Campo de Nandurocay. In lat. $23^{\circ} 58'$ and long. 56° it receives the Intanarami on the right, and then for some little distance becomes enclosed in a narrow valley, overlooked on the left by Monte Isla-Cuaré and on the right by Monte del Pederal. Thence it proceeds W.S.W., passing over a bed of grey sandstone, in which, separated by some interval, are two shoals which are dreaded by all boatmen; the first is known as the Arrecife di Peralta, the other is a cluster lying between the Canchas Bolascua and Itayuru. They are a hindrance of any account only in seasons when the water is extremely low; I ascended the river when the stream was at a moderate height in a boat

of 40 tons, and I believe that it would not be difficult nor a matter of great expense to make a new channel altogether.

Close above these reefs the Jejuy receives its first important affluent on the left, the Rio Curuguaty, in lat. $24^{\circ} 3'$ and long. $56^{\circ} 16'$. This, too, is navigable; it waters the extensive yerbales of what was the former province of Curuguaty and part of those of San Estanislao, and is the route by which much of the yerba from the forests of the Upper Parana is transported. It has subsidiary affluents of its own—the Candi-y, the Carembatay, and the Corrientes.

The Jejuy now assumes a more northerly direction, and in lat. $24^{\circ} 2'$ and long. $56^{\circ} 13'$ receives its second and last left-hand affluent—the Capiiguary, set down in the map variously as the Caapivary, the Capivary, or the Vavipary. I prefer to retain the orthography of Capiiguary as representing the true significance of the word, which in Guarani means “the river of Cabiais,” i.e., of water-hogs, animals called *carpincho* in Spanish, *capivara* in Brazilian, and *capiigua* in Guarani. Obviously the name is only a corruption of the original designation. The river rises in the mountains of San Joaquin, and crosses the yerbales of Itanara, being navigable throughout.

After receiving this tributary, the Jejuy arrives at the village of Placido, in lat. $23^{\circ} 57'$ and long. $56^{\circ} 46'$, opposite to which is a landing-place belonging to the little town of Lima, a short distance away on the Aguaray Guazu: it then takes a W.S.W. direction, which it practically maintains until it flows into the Paraguay. It passes (in lat. $24^{\circ} 10'$) a small village named La Niña, standing on a slight eminence, beneath which runs an unimportant stream, and from this point assumes imposing proportions, approaching 100 yards in width and from 12 to 15 feet in depth, the water never falling low enough for traffic to be interrupted. At no great distance below La Niña is the mouth of the Aguaray Guazu.

Passing in succession the villages of Sargento Loma, Isla Cuña, Rosarito, and Machu-Cué, the Jejuy reaches the port of San Pedro, one of the principal towns in all Paraguay. The town lies back about a mile and a half from the river, in lat. $24^{\circ} 6'$ and long. $57^{\circ} 13'$; what is designated its “port” being



E. Plou, Nourrit et C^{ie}, Paris.

COUNTRY FOLK OF SAN PEDRO

at present simply an embankment 20 feet high, allowing of no proper accommodation for landing. It would, however, be matter of hardly any difficulty to hollow out a basin in a small arm of the river that skirts the embankment, and thus to provide room enough for the numerous *chatas* laden with yerba that arrive every day. San Pedro, no doubt, is already a lively place as the centre of all the trade of the valley, and the Government has under consideration a plan for constructing a jetty which will facilitate business. Opposite the port a picado has been opened, leading to Barranquerita on the Paraguay, apparently with the intention of making that also an available place for embarkation.

The Jeju enters the Paraguay by two arms, of which the lower is the smaller, and is rarely used by boatmen; the upper one is wide, with a good channel, but the mouth is obstructed by a bank which bars safe access when the water fails, and a year seldom passes without some vessel being lost upon it.

According to Mouchez, the mouth of the Jeju is in lat. $24^{\circ} 11' 32''$ S. and long. $59^{\circ} 40' 47''$ W. of Paris ($57^{\circ} 20' 37''$ W. of Greenwich).

We have now to say a word concerning the secondary affluents.

The basins of such as lie between the mouth of the Jeju and Asuncion are not of any great extent. During the larger portion of the year they are navigable only for a short distance, and soon degenerate into mere swamps; in fact, the entire district lying between the Paraguay on the west, the central Cordillera on the east, and the mountains of Ajos, San José, and Tobaty on the south, is everywhere marshy. There are numerous lagoons, such as the Laguna Negra, the Laguna Aguacati, and the Cañada de Piraya, the land intervening between them being thoroughly saturated with moisture. This general condition of the soil at once accounts for such minor rios as the Quarepoti, Tapiracuay, Capiipobo, Manduvira, and Tobatiry, presenting few features of interest.

The basin of the Peribehy, which lies beyond, is both short and narrow, and drains the deep and fairly dry valley that is enclosed between two mountain ranges, of which the Cordillera of Altos is the most southerly. It constitutes one of the most

fertile districts of Paraguay, and would seem to possess a mineral wealth which must before long attract much attention.

An outlet, called the Salado, from the Laguna Ipacaray, a picturesque lake on the S.W. of the Cordillera of Altos, makes its way through one of the most charming valleys of South America.

Below Asuncion, on the left, is the Tibicuary, the only affluent that can in any way compete with the Jejuy in magnitude.

Its mouth, according to Mouchez' estimate, is in lat. $26^{\circ} 36'$ S., and long. $58^{\circ} 14' W.$, and is nearly 300 yards broad.

Tracing the course of the river upwards, we find that it takes a N.N.E. direction, and receives on its right the Rio Negro, which issues from the Laguna Ypoa; it then diverges to the S.E., passing to the south of the Laguna Camba, and skirting the Sierra de Montiel before reaching Villa Florida below Quiquyo. Its width is here reduced to 80 yards. After receiving the Mbuyapey it again turns due south, and in consequence of being obstructed by the Cerro Santa Maria, it is found divided into two branches. The former of these, under the name of Tibicuary-mi, bends due north towards Mbuyapei, east of the Cordillera Caballero and Ybitimi, and west of Villa Rica, ultimately being found in its source in the Cordillera Caaguazu above Carayao, a point that ought not to be lost sight of in the topography of Paraguay, as not unlikely to be serviceable in carrying out future schemes of communication. The lower branch is known as the Tibicuary-Guazu. Inclining first to the east, it receives the Pirapo on the right, and may be followed through the yerbales of Yuty to its source, which exists in the great amphitheatre formed by the central Cordillera of Paraguay, the eastern side of which remains a subject of speculation rather than of ascertained knowledge.

If the Calvaries of geographical exploration were not stained with blood by its pilgrims, they might perchance never have attracted the attention of the multitude. Crevaux bore the cross along the Pilcomayo, succumbing to its burden, so that to-day the name of the river is amongst the most familiar of all the rivers of South America, and now the discussion is

endless as to its political importance and to its possibilities as a future highway for commerce.

Now, apart from the cruel drama which was enacted there, the question will arise whether the interest attaching to the spot is worthy of its reputation. Is there anything in the knowledge of its geographical details which can adequately compensate for the generous blood that has been sacrificed, for the last two centuries, in the unsuccessful ventures to explore it? I think not: and I would pause to weigh some of the arguments that may assist us in forming a reasonable opinion in the matter.

Stretching, as it does, like a band right across the impenetrable desert of Chaco, between Bolivia and Paraguay, it might seem at once to be marked out as a natural highway to maintain the communication of the two countries. Navigable at its first rising in the mountain-chain from which it descends, and navigable too for many miles before its confluence with the Paraguay, it might *à priori* be assumed that it would be navigable throughout, a conjecture that would be strengthened by the considerations that it traverses a country that is absolutely flat, and that its waters are sufficiently abundant to keep up a full average depth at every season. Under such assumption all the expeditions to make the passage have been started.

But, however tenable the theory might seem, effort after effort has ended in defeat.

On Aug. 18th, 1721, Father Patiño left Asuncion to go up the river. At the end of twenty-five days he came to a barrier of rocks that checked his progress, and he had to hew out for himself a side-channel by which he might escape the obstacle; but he accomplished his task only to find himself facing a series of rapids that continued for a hundred miles. Shortly afterwards he had to retreat before the savage opposition of the Indians, and to make his way back. He had spent forty-two days in making his venture.

In 1741, Father Castañares undertook the same journey of investigation, but without any better result.

An opposite course was adopted a few years later by Casales, who resolved to make, if he could, a descent of the river from

its source: his undertaking was a failure, and, after enduring considerable hardships, he was obliged to return to his starting point.

A like attempt was made by the distinguished Azara, in 1785; but a very short experience convinced him of the impracticability of his design.

Such was the upshot of the various experiments made in the 18th century.

In our own times, one of the first expeditions on the Pilcomayo was that which was led by Col. Margarinos, who set out from Bolivia in 1843. His journey was equally unsuccessful as those which had preceded it, but the failure resulted not so much from difficulties of progress, as from lack of fresh water, the river water everywhere being brackish and salt.

In the following year Lieut. Van Nievel, of the Bolivian army, organized another expedition, and set out on the 30th of September to renew the exploration. Again the undertaking was a failure; the account he published details the obstacles he encountered, among which rapids, marshes, and quicksands played a prominent part; and at last, having gone a distance which I think he must have over-estimated at 389 leagues, he was compelled to retreat and leave his purpose unaccomplished.

Up till 1882 we hear of no further attempt to explore the river, the uselessness of these explorations having apparently been recognised.

However, after a while, Dr. Crevaux, who was waiting a favourable opportunity for commencing the great journey which he had proposed to make from the basin of the Paraguay to that of the Amazon, found that he had time on his hands, and resolved to employ the interval in an ascent of the Pilcomayo. The lamentable result of his venture is only too well known; he and all his escort lost their lives.

This tragedy once more excited the zeal of other explorers, and one after another, Thouar, Fontana, and Feilberg, were prompted to try and solve the enigma of the mysterious river.

Thouar, starting from Bolivia with a considerable party of followers, kept at first close to the river banks, but finding it

impossible to continue in that way, he struck boldly to the east, across the Gran Chaco wilderness, and succeeding in reaching Asuncion. Undaunted, he made further attempts again in 1885 and 1888, but only to find himself foiled, barely escaping with his life.

No better fortune attended Fontana.

As to Maj. Feilberg, it cannot be denied that, although he was compelled to desist from his attempt to accomplish the passage of the river, he brought back a map of the district he had traversed, which none of his predecessors had thought of doing. The map, which has been carefully reproduced by Olaf Storm, the engineer, affords most conclusive proof that no scheme can be devised for making the Pilcomayo navigable; it is my authority for that part of the river which is shown in the map which accompanies this volume.

Thus, of all the ten expeditions that have been organized, not one has proved a success; and I consider that M. Thouar's journey should hardly be taken into account at all, as it was made by land, and has consequently nothing to do with the question at issue.

Taking all the accounts together (including those given by explorers, who maintain that the river could be rendered navigable), the conclusion to be arrived at is inevitable, that the course is obstructed by rapids, that the stream spreads out and loses itself in lagoons which have no proper channel, and that its current is blocked up by 'snags' (raigones) which are at least as dangerous as rocks; moreover, even in the navigable parts the windings are so numerous and sharp that navigation is difficult and towing impossible.

I desire nothing better in proof of this than the following lines taken from a book recently published by Dr. Daniel Campos, who was the leader of the expedition of 1883, of which M. Thouar was a member.

"The Pilcomayo," he says, "flows upon soil composed of sand, calcareous and argillaceous rocks, and red sandstone, which has become more or less hardened by the action of the water. Its bed could be easily cleared by the use of steam-bores, dredges, and dynamite. By the assistance of agents such as

these, its channel could be widened where it passes through the red sandstone, and deepened where the river now spreads over immense beds of sand. And if this is so, it may be affirmed that the navigability of the river is proved."*

I say that the conclusion I should draw from such premises would be the very reverse of that which Dr. Campos accepts. Surely, if a channel in the Pilcomayo is only to be obtained by excavations effected by "steam-bores, dredges, and dynamite," the river cannot be said to be navigable in its present condition. This is all we wanted to know in order to enable us to judge of the future of the river as a commercial highway.

The canalisation of a river like the Pilcomayo is a dream not to be realized in South America ; it means an outlay only to be incurred in densely peopled centres, or for such promising schemes as the Suez Canal. The Argentine Republic, although it spends millions on public works, has never yet been able to find the capital for dredging the passage of Martin Garcia, which opens the way for all the trade of the Parana valley to Rosario, one of the busiest of its ports ; and how should Paraguay provide such lavish sums ? And, after all, what amount of merchandise could the Pilcomayo carry to cover such an enormous investment ? And could colonies be founded on such saline sand and marshy clay as should be able to feed it ? Père Patiño spent forty-five days in making half the journey ; Thouar was sixty-two days on the road : is there any commodity that could bear so tedious a portorage ? Rapidity of locomotion is essential to the vitality of young colonies, and their produce must not have to be brought to the market by prolonged and dilatory methods. Railroads or swift steamships can alone meet the requirements of the case.

By all means let a railway be laid down between Bolivia and Paraguay, but let us hear no more of the 18th century romance of utilizing the Pilcomayo ; let explorers turn their attention to more practical ideas. I can quite sympathize with men like Crevaux undertaking such adventures from enthusiasm, or even for the sake of reputation, and I should not think of

* Vide "*El Censor*," Buenos Ayres, Feb. 11th, 1889. No. 1078.

criticising their motives; but I have no patience with their efforts, however chivalrous, being vaunted as serving any useful purpose.

It is much higher up that an opening to Bolivia must be effected: it must not be attempted by the Pilcomayo, nor yet from Villa Concepcion, nor even from the Apá. Facts demonstrate this by incontestable evidence.

And further than this: not simply is the watercourse of the Pilcomayo incapable of being adapted for traffic, it is equally certain that its valley is absolutely unsuitable for a land route. The account given by Dr. Campos is practically conclusive on this point. He writes: "Of the sixty-two days that were consumed in getting from the Crevaux colony to the bank of the Rio Paraguay, where we were saved by Guana, fifty-seven were spent in actual marching, which covered a distance of 200 leagues. For the organization of a transport service, it would be necessary within this space to have at least forty stations, that is, forty places in the heart of the Chaco where garrisons would be placed to guard against the attacks of Indians, who can concentrate themselves anywhere they please."

"Would this be easy? would it even be feasible?"

"Notwithstanding the general characteristic flatness of the Chaco, three different levels are distinctly to be recognized. The lowest of these may be said to be so perpetually subject to floods that it could never be utilized for more than four months in the year. We crossed it at the season of the greatest drought, but even then there were broad tracts quite impassable on account of the sloughs and swamps. What must these be in the eight months from November to the following September, when the floods have rushed over them in furious torrents? To avoid such obstacles, a wide *détour*, full of unknown perils, would have to be made, resulting in the journey taking twice or thrice as long as that by way of the Pilcomayo. And to what good? . . . Such a road, after all, could be used at the best only during the months of August, September, October, and November; and would annually require to be repaired at great cost."

After this evidence of a competent eye-witness, there would seem to be no room for further debate, and the conclusion must

be accepted that the land-route, equally with the river-route through the valley, is absolutely impracticable.

The question of the construction of a railway in the latitude of Villa Concepcion has been agitated for some time. It would cross the Chaco and have its terminus near Sucre. The proposal excited a good deal of interest in the Buenos Aires newspapers, in consequence of a report made by M. Freund, a land agent, who surveyed the country in that direction for about 120 miles. A young engineer has since then been sent to the spot to make further reconnaissances. But as this seems to have been done merely for the purpose of furthering some land speculations, I only refer to it by way of caution, and to obviate misconception. My own information on this part of the country I obtained from my friend, M. Marcel Legendre, an engineer who accompanied Freund in the early part of his journey. His account corresponds in every particular with that given by Dr. Campos, so that I feel sure that, whatever is said to the contrary, the Chaco in this latitude has identically the same characteristics as it has in the valley of the Pilcomayo.

A good deal too has been said, both at meetings and in newspaper articles, about the discovery of another practicable route in the latitude of the Rio Apá, said to have been discovered by M. de Brettes in 1887. I could not go so far as to deny the existence of solid ground at that latitude, but it is at any rate very questionable how far it would extend, as no one has hitherto penetrated into the country far enough to gain the evidence of facts. Everybody in Paraguay must know well enough that M. de Brettes was only fourteen days on his journey, including going and returning, and in so short a time it was physically impossible for him to have reached Bolivia, as he claims to have done, nor even to penetrate further than thirty leagues into the interior. M. Thouar travelled at the rate of about four leagues a day, and all travellers agree in saying that it is impossible to exceed this to any considerable extent. That M. de Brettes should therefore have travelled 200 leagues, in a direct line, is quite out of the question. My own view of the matter would be at once confirmed alike by the French authorities in Asuncion and by the residents in Puerto Casado, whence M. de

Brettes set out. In trying to form an opinion as to the question of the Chaco, account should be taken only of information obviously deserving of credit, and accounts furnished by men like Thouar, Feilberg, Campos, Storm, and others, whom every one respects for their courage and conscientiousness, must not be put on the same level with mere "travellers' tales."

It is my conviction that the only practicable route between Bolivia and Paraguay is that which was explored, in 1888, by Suarez Arana and Calvimontes, who started from Bahia Negra in lat. 20°, and reached Bolivia beyond the Cerro San Miguel, as referred to in a previous page.* It is only in this latitude that the Chaco ceases to be a marsh. We there find ourselves on the side of a fault or line of dislocation, which extends in a N.W. direction. The soil hereabouts completely changes its character, and there seems every reason to believe that it is as well adapted for cultivation as the left bank of the Paraguay. Lower down the Chaco is swampy. With the exception of a narrow fringe, which rises about fifteen feet above the Paraguay, and of a few detached mounds covered with palms, the whole of the country does not rise above the level of the river, and sometimes even sinks below it. In ordinary times it is a swamp; in times of flood it is covered with water. Moreover, owing to its flatness, and to saline impregnations, the great part of the Chaco is quite unsuitable for agriculture.

I am quite aware that my opinions will be protested against, but I am prepared to back them up by proofs, both scientific and experimental.

* Vide page 33.

CHAPTER VI.

VEGETABLE AND ANIMAL LIFE: MINERALS.

Naturalists: Father Asperger, Azara, Bonpland, Parodi, Balanza—Forests, trees, and underwood—Denizens of the woods—Beasts, reptiles, birds and game—Hunters and hunting—Climate—Minerals.

THE natural history of the country has yet to be written. Nor is this surprising if it be taken into account how successive governments in the early part of this century persisted in the Jesuit policy of isolation. The presidents, Francia and Lopez, looked upon all strangers who arrived at Asuncion as intruders, whose very presence jeopardised public safety, and prohibited them from advancing into the interior. Francia, indeed, was not content with putting intruders under surveillance; he made Paraguay a trap, so that adventurers who succeeded in getting in were debarred from the chance of getting out. Thus it was that M. Bonpland and Dr. Rengger, in spite of the protestations of themselves and their respective governments at home, were detained for several years, and only obtained their liberty on the death of the dictator.

Such a condition of things naturally damped the ardour of *savants* in this direction, and, in spite of their attractiveness, the fauna and the flora of Paraguay remained undisturbed in their mysterious solitude.

We nevertheless are in possession of a few reports on the natural history of the country. Some of these date back to the time anterior to Francia's dictatorship; for others we are indebted to a few inquirers whom Lopez allowed to visit the country.

With regard to the fauna, the monographs of Azara* are a zoological treasure. It is well known what interest was excited in Europe by the publications of this Spanish *savant*,

* Feliz de Azara, "*Essai sur l'histoire naturelle du Paraguay*." Paris, 1809.

who was one of the leaders of the reaction against the conventional school of Buffon. His ornithological researches and his descriptions of some of the larger mammalia are especially valuable. I have many times found his descriptions to be models of accuracy.

The publications that relate to the flora are somewhat less rare. The Jesuit Fathers had a great predilection for botany, to which they were drawn by their desire to increase their acquaintance with such plants as might be serviceable as drugs. Consequently, we possess some interesting lists of herbs and shrubs which they utilized for medicinal purposes. Amongst these I should especially mention those of Father Montenegro* and Father Sigismund Asperger. Azara and Father Lazano each give a limited list of plants, but their descriptions are too elementary to be of much service. At a later date, Bonpland, the botanist, during his detention and long residence in the Missions, had ample time to prosecute his researches, but he published nothing. His notes and herbariums were dispersed at his death, and only in part recovered by Count de Brossard, the French *chargé d'affaires*. These treasures were stowed away in some forgotten corner, and I am not aware that any use has been made of them except by Professor Baillor, and that only to a limited extent.

Although St. Hilaire and Martins did not enter Paraguay, they explored the corresponding latitudes of Brazil, and have described many of the plants they found; but no one has done more in this branch of study than M. Domingo Parodi, to whom we are indebted for an interesting treatise on the common plants of the country.† The French botanist, Balanza, has made some very fine collections, including over 3,000 species, which he has sent to various museums in Europe, but his researches were limited to an area bounded by the parallels of 25° and 26°, and the meridians of 46° and 58°. Messrs. Lorentz and Spegazzini, professors in the university of Buenos

* "*Libro compuesto por el Hermano Pedro de Montenegro de la C. de J. Año 1711.—En las misiones del Paraguay*," MS., in folio, 357 pp., with 152 pen and ink sketches; in the Library of the Duchess of Osuna, Madrid.

† Domingo Parodi, *Notas sobre algunas plantas usuales del Paraguay*. Buenos Ayres (E. Coni y hijos), 1886.

Aires, have travelled in the neighbouring province of Corrientes and in the Chaco, and succeeded in acquiring much information.

Of the geology of Paraguay, on the other hand, we know next to nothing, for not one of the geological explorers of South America, neither D'Orbigny, Darwin, Agassiz, Bravard, nor Burmeister, has ever visited that country. The little we know is derived from a few observations made by Dr. Rengger, and from some specimens of rocks which were brought to Belgium by Col. du Graty, in 1861. I hope before long to publish the result of my own researches. These were mainly directed towards an examination of the great lines of dislocation or faults, which have played so prominent a part in the geological history of the country, and which I have already referred to.

The limit of a work such as this renders it obviously impossible for me to enter minutely into any technical details of natural history, and I must confine myself to some leading points of interest with regard alike to the flora and the fauna.

THE FLORA.—Well defined botanical regions correspond to the geographical division of the country into an Eastern and a Western section.

In the east, that is Paraguay proper, the prevailing feature consists of virgin forests, with majestic trees, tangled lianas and brilliant flowers, these being broken ever and again by vast tracts of pasturage consisting of tall bushy grass, and hills covered with *pindo* and *mbocaya* palms.* There are likewise groves of orange trees never failing to bear fruit, clumps of bananas, and large round bushes of *timbos*,† which in the spring are gay with bright violet blossoms.

The Chaco, on the other hand, presents the bare aspect of a heath, occasionally marshy, or dotted over with palms, known as *yatais*,‡ rarely growing close enough together to make a grove. Here and there, on rising ground or when the primeval rock comes to the surface, the monotony of the landscape is relieved

* *Cocos australis*, Pindo; *Cocos sclero-carpa*, Mbocaya.

† *Enterobolium timbocaya*, Timbo, a leguminous plant.

‡ *Cocos yatais*.

by dense *quebracho** forests, which break the grey and dreary line of the horizon.

The two illustrations that are given are copies of photographs, and present a faithful idea of the difference between the vegetation of the Chaco and that of Paraguay proper, the latter in the richness of its beauty contrasting strongly with the desolation of the other.

Such are two broad features. It should not, however, be forgotten that on going from south to north, and thus passing within the tropical regions, certain modifications of the vegetation may be observed. These modifications correspond in a large measure with a change in the nature of the rocks, the south being occupied by red sandstones, the centre by grey sandstone, and the north by limestone.

A similar change may be observed if we proceed eastward, whatever Parodi may have stated to the contrary. In fact, it is only in Eastern Paraguay that the *yerba-mate* † (which produces the famous tea of the Jesuits) is to be found. Certain plants such as the *inga* ‡ become more common, whilst others such as the *tala* § disappears altogether.

The natural orders that have the largest number of representatives in this region are :—

The leguminosæ.
The terebinthaceæ.
The cucurbitaceæ.
The euphorbiaceæ.
The rutaceæ.
The myrtaceæ.
The bignoniaceæ.
The urticaceæ.

The papaveraceæ, rosaceæ, borraginaceæ, ranunculaceæ, umbelliferae, and caryophyllaceæ are very rare.

I shall deal later on with the commercial utility of certain products of the vegetable kingdom, and therefore confine my-

* *Loxopterygium Lorenzii*, Quebracho Colorado.

† *Ilex Paraguariensis*.

‡ *Mimosa inga*, a leguminous plant.

§ *Celtis tala*, the nettle-tree.

self for the present to an enumeration of those plants which are most widely distributed, or which present features of special interest.

Shrubs of the *prosopis*, *mimosa*, and *acacia* tribes abound everywhere in the underwood, and, together with bamboos and lianas, they form dense thickets. Some of these shrubs attain a considerable height, as, for example, the *algarrobo* (*Prosopis dulcis*), called *ipobé* in Guarani, the wood of which is employed for building purposes, whilst the bark is used for tanning hides.

The *quebracho colorado*, which grows so freely in the Chaco, is found also on the banks of the Tibicuary, and is most suitable for building. It is not to be confounded with the *quebracho blanco* (*Aspidosperma quebracho*), which flourishes more to the south, and is rarely to be met with beyond lat. 26°.

The wood of these trees is very hard and of great density, as will be shown in a table in the Appendix; it will not float, but, for strength and durability, scarcely any of our European timber can compete with it.

The following should be especially mentioned:—

The *urunday* (*Astronium fraxinifolium*, family of the *Terebinthaceæ*).

The *curupay* (*Piptadenia communis*, order of the *Leguminosæ*).

The *ñandubay* (*Acacia cavenia*, of the same order).

The *lapacho* (*Tecoma curialis* and *T. varia*, of the family of the *Bignoniaceæ*).

The *laurel* (*Hectandra porphyria*, of the family of the *Laurinæ*).

The *tatané* (*Acacia maleolens*, of the order of the *Leguminosæ*).

The *taruma* (*Vitex taruma*, of the family of the *Verbenaceæ*).

The *ayushandy* (*Persea*, sp. ?, of the family of the *Laurinæ*).

The *cupai* (*Copaifera Langsdorfii*, of the order of the *Leguminosæ*).

The *quaydibi* (*Patagonula americana*, of the family of the *Borraginæ*).

The *ibira-hoby* (*Tecoma leucozydon*, family of the *Bignoniaceæ*). Another tree known by the same name in Guarani is the *Cæsalpinia ferrea*, of the *Leguminosæ* order.

The *handipa* (*Genipa americana*, family of the *Rubiaceæ*).

The *pacara* (*Enterolobium*, order of the *Leguminosæ*).

The *ibyraro* (*Ruprechtia excelsa*, family of the *Polygonaceæ*).

The *palo santo* (*Guayacum officinalis*, family of the *Rutaceæ*).

The *tatayba* (*Broussonetia tinctoria*, family of the *Urticææ*).

The *tayi-pichay* or *lapacho crespo*, (*Tecoma curioles*, family of the *Bignoniaceæ*).

Besides these there are two palms serviceable for building purposes, namely, the *pindo* (*Cocos australis*) and the *mbocaya* (*Cocos sclero-carpa*). The foliage of the *pindo* is used as fodder for horses, and the date-like fruit is much relished by the Indians. The *mbocaya*, too, is much appreciated, as the kernel of its fruit produces a valuable oil, and it yields fibre of great strength.

The wood of several other trees, although less hard, is nevertheless very useful; foremost amongst such is the American pine (*Araucaria braziliensis*), which no doubt will be largely employed in the future. It is known in Paraguay under its Guarani name of *Curi-y*. Then there is the *acajou* or "cedar" of the missionaries, (*Cedrela braziliensis*), which yields the "female" mahogany of the traders; and the *timbo*, (*Enterolobium timbowa*), the wood of which is very light, and especially suitable for making canoes.

A widely distributed tree-shrub (*croton succirubrus*) yields a red resin, known as *sangre-de-drago*, or dragon's blood. There are several varieties, too, of the *samuhu* (*Bombax*), of which the most common is that known at Tucuman as *palo borracho* (*B. ventricosa*), the fruit of which yields vegetable silk. I have seen some magnificent specimens near the Ygatimi, and M. Luigi Balzan has described those which he saw on the bank of the Rio Apá.*

Others much in quest are the *quina-quina*, (*myrospermum*); the *erythroxylon*, or coca of Paraguay; the *jacaranda* (*machaerium*); the *palo de rosa*, or rosewood tree; the *inciense*, or incense tree of the Jesuits; the *caranday* (*Copernicia cerifera*); and the *abati timbaly* (*Hymenæ courbaril*), from which the

*" *La soie végétale*," par Luigi Balzan. *Revue du Paraguay*, No. 5, p. 16, 1888.

Indians procure a resinous extract, which they like very much, and which is really the "gum copal" of commerce.

Nor should the trees with edible fruits be overlooked. Amongst them should be noticed the *guava* (*Psidium microcarpum*), with its several varieties; the *ibapohy* (*Ficus ibapohy*), producing a small black fig that is much relished; the *guavira-mi* (*Eugenia* or *Myrtus*); the *manga-triba* (*Hancornia speciosa*); the *tiandypa* (*Genipa americana*); the *yatai* (*Cocos yatai*), from which an excellent starch is obtained; the *mamon*, or Papaw-tree (*Carica papaya*), well known for its acrid milky juice; the *yba-hai* (*Eugenia edulis*); and the *araticu-guazu* (*Anona sylvatica*), known in Peru and Brazil as "the countess's fruit," but more generally as the *cherimoyer*.

The orange-tree grows everywhere in abundance, but it is for the most part an imported variety, except, perhaps, that known under the Guarani name of *apebu*. It will require more definite consideration at a later page.

To all these must of course be added the *yerba* (*Ilex paraguariensis*), known to the natives as *caa*, which produces the famous Paraguay-tea. It grows freely in the eastern district, all about the Sierras Amambay and Mbaracayu, and on the Central Parana.

I have no space to enumerate all the trees met with, but from what I have said it will be clear that the flora of Paraguay, although still very imperfectly known, is one of exceeding wealth and variety.

The shrubs are even more numerous and interesting than the trees. I have referred to M. Balanza, who collected over 3,000 species within a limited area. If the regions lying beyond the southern tropic were to be explored, that number would be largely increased. I shall merely refer here to a limited number of some of the useful shrubs.

The undergrowth of the forest-primeval has so frequently been described, that I may be excused for not introducing here an additional description. Besides, were I to do so, I should run the risk of losing myself among an inextricable tangle of leaves and flowers, spread over carpets of moss, of lianas climbing up reeds or festooning dwarf-palms, of ferns

unfurling their enormous fronds, and brambles whose thorns forbid access to the thickets. The lives of many botanists are likely to pass away before the constituents of this labyrinthine verdure have been fully classified. Up till now it is only the Indian who recognises at a glance the plants which yield him perfumes or possess medicinal virtues. He possesses, in other words, a knowledge of *yuyu*, or simples, and it is from information obtained from him that much of our own limited knowledge has been drawn.

Some of the knowledge thus derived has been valuable. Parodi, whose medical skill was in great request during the period of the Paraguay War, has told us how, when it was impossible to obtain any foreign drugs on account of the blockade, he was obliged to fall back upon the native medicines. He writes in his notes*: "Both in private practice and in the hospitals, civil and military, I have seen the application of many of the plants mentioned in my pamphlet, and I am quite satisfied that a certain proportion of them have medicinal properties that, were they submitted to chemical analysis, would entitle them to a place in our pharmacopœia." No doubt it would be requisite to use much circumspection, as I never remember showing a plant of any sort to a native but that he was ready to enlarge upon its healing powers: this claim to curative virtue is too universal.

Among the orders that are most frequently represented are: the *chenopodiaceæ*, the *labiata*, the *verbenaceæ*, the *compositæ*, the *aurantiaceæ*, the *amomæ*, the *daturæ*, the *nicotianæ*, the *solanaceæ*, the *mimosæ*, the *euphorbiaceæ*, the *umbellifera*, the *convolvulaceæ*, the *myrtaceæ*, and the *malvaceæ*. And I would not willingly omit the *orchidaceæ*, those attractive decorations of the forest known throughout the country under the poetical name of "flowers of the air." In some spots the larger trees are covered on every branch with their pale green foliage, long aerial roots, and drooping blossoms.

Such are only general outlines of the flora of Paraguay. If anyone is disposed to complain of the brevity of the catalogue

* *Notas sobre algunas plantas usuales*, Buenos Aires, 1886.

that is given, I can only reply that it is quite beyond my purpose to compile an exhaustive cyclopædia.

THE FAUNA.—We may now turn to the fauna.

If there is an attraction for the botanist in the multiplicity of the strange vegetable productions of the forest, assuredly there will be no less scope for the diversion of the sportsman and the delight of the zoologist. The sportsman may take his choice between stalking wild beasts and aiming at small game; the naturalist will find himself in the midst of an endless variety of insects, butterflies, and birds.

We hear much of hunting in Africa, and there are exciting tales of chasing gazelles and laying ambuscades for elephants; the story of hunting in Paraguay has yet to be told, and it needs but a Baldwin or a Selous to immortalize it.

What enjoyment I had in the days of my expedition in 1887, and again the next year on my journey to Cuyaba with my friends Vicomte Obert and Henri Rochefort! What shooting it was!—from huge crocodiles to tiny parroquets; from brutes of jaguars to slender antelopes!—the variety was infinite.

Foremost amongst the larger animals should be reckoned what the Americans call a tiger, but which is really the jaguar (*Felis onça*), from the Guarani word *yaguarete*, equivalent to "great dog." It is the most formidable of the carnivora of the country; it is so strong that it can easily carry off an ox or a horse. The country abounds with them, but only in the interior, as they hardly ever frequent the neighbourhood of villages, and even avoid isolated dwellings. It is not in the nature of the beast voluntarily to attack man; and this I can say with much confidence, notwithstanding the assertions of travellers who have been over-credulous in listening to sensational stories. Many a time have I and my companions met one in the underwood, and it never failed to give a savage growl and to bound rapidly away; and often, as a group of them have collected round my encampment, I do not think they have ever approached within twenty yards of it; in fact we became so accustomed to them that when we were tired we would let our fires go out, and ourselves fall off to sleep

without the precaution of providing a sentinel. Ever and again we might be aroused by the cracking noise of a branch giving way under the weight of the brute, and on looking out we could see its eyes flashing in the darkness; but there was no fear of an attack.

Once only, when we were on the Upper Parana, we were woke out of our sleep by a jaguar bounding into the midst of us; but it had no sooner come than, like a flash of lightning, it was gone again. It had probably been attracted by our dogs, against which they wage constant war, but our movement startled it, and made it take to flight. We gave it a parting shot from our rifles, and perhaps it was fortunate we failed to hit it, for the beast, although ordinarily afraid of man, becomes a formidable enemy when it has been infuriated; an ill-fate awaits the being who, in an encounter with the enraged creature, fails to lodge a ball between its eyes, or to send his knife home to its heart.

Some few days before I set out on my travels in the Jejuy valley, a party of yerba gatherers were resting in their encampment, when an enormous jaguar rushed in among them and carried off their leader. The consternation in which I found the poor fellows was terrible. We attempted a pursuit, but utterly without success. Instances like this are very rare, and I refer to it as quite exceptional, and I might say unknown since the time of Lopez.

At the date, however, of the melancholy war, when corpses were left unburied, and fugitives were dying in the woods, the jaguars became so familiarized with human flesh that they sought for it, and devoured it greedily; but as the supply diminished, the craving died out, and the young ones never had the opportunity of acquiring the taste. Whatever traditions of casualties survive must all be assigned to a past generation of tigers, and men may now be free from alarm about the security of their limbs.

Besides the jaguar, there is the American lion or puma (*Felis concolor*), which, however, is very rare in Paraguay, although it is common in the Argentine Republic. In the Chaco district I saw one, and one only, and scarcely any on the outskirts of Brazil.

The tiger-cat (*Felis Geoffroi*), on the contrary, is not unfrequently met with; its fur is of exceptionally good quality. The animal, it is said, may be tamed to a certain extent, but no great confidence can ever be placed in its temper.

The *Canidae* is a family that is somewhat largely represented. Perhaps the first that should be mentioned is the Aguara-guazu (*Canis Azarae*), as it really should be reckoned amongst the beasts of prey. It grows to a considerable size, being sometimes over 30 inches in length. The hair is long, its colour being tawny over the entire body, except on the belly, where it is white, and there is a black stripe down the back; the legs also are black and remarkably long, looking, as the creature strides along, as though they were tightly cased in fine leather; its muzzle, likewise, is black and very pointed. Its ears, which are well nigh always erect, are very large; tawny, like the body, on their outside, but covered with white hair inside. The tail is long and bushy, like the tail of a fox. It lives almost exclusively in the swamps, and hunts at night, making a peculiar hoarse bark, which can be heard at a considerable distance, and which sounds most melancholy in the darkness. I have heard Indians say that it will not hesitate to attack a jaguar, and very often gets the best of the encounter. I give these details of the aguara-guazu as so little is known of it, the only description of it being, as far as I am aware, that given by Azara. The Sanapana Indians procured me a young one, which I managed to keep for five months. It became partially tame, probably through playing with my dogs, so that when I was alone I allowed it to be loose, but it barked fiercely at every stranger. When I left Asuncion in January, 1888, I brought it away with me, but it could not bear confinement in a cage, and died a lingering death at Buenos Aires, after refusing all food. A post-mortem examination showed that it had died of sheer starvation, and that there was no disease or anything abnormal in the condition of the kidneys, although Azara and later writers affirm that this species of *Canis* has an obstruction in that organ.

There are likewise to be found the *Canis gracilis* and *Ursus lotor*, of which a fine specimen was killed by Vicomte Obert.

Martens are variously represented. One species there is, a kind of otter (*Lutra paranensis*, Reng.) which should not be confounded with the *Myopotamus coypus* of the muriformia family, that the people of the country erroneously call *nutria*. There is also the pole-cat (*Mephitis patagonium*), known here as the *sorino*, an animal which is detested on account of the stinking fluid which it emits when attacked, and of which the stench cannot be removed from whatever it touches.

A *nasua* of the family of the Ursidæ is not uncommon ; it is called *cuati*, and is the *Nasua socialis*, being easily tamed, so that it will become as domesticated as a cat.

A somewhat formidable creature is the ant-bear, an encounter with which is not always free from danger.

The Tapir (*Tapirus americanus*) is another inhabitant of the forest, its shrill whistling cry being often heard throughout the night. The Guaranis call it *mboresi*, the Spaniards *gran bestia*, and the Portuguese *anta*. It is not aggressive unless interfered with, always running off at a full gallop, straight through the brushwood. Its skin is considered valuable, being thick and impervious to gun-shot, so that to kill it, it is necessary that a true aim must be made either at the forehead or just behind the shoulder.

Another pachyderm, of the family of the Suidæ, is the peccary (*Dicotylis torquatus*.) These brutes congregate in herds, and are dangerous to sportsmen on the plains, as likely to trample them down. They can be eluded by climbing up trees, from whence they can be safely attacked, and I have seen them in this way killed by means of sticks. To a certain extent they can be tamed, and I have had one in my keeping that would follow me about like a dog, but I hardly know a creature that can become more unmanageable.

Amongst the ruminants there are various kinds of deer, all called *guazu* in Guaraní, and severally distinguished as *guazu pyta*, *guazu vira*, and *guazu pucu*.

The rodents, too, are largely represented. Amongst the more interesting of these I may mention the *Hydrochaerus capybara*, Erxl. It is an animal of very much the size and appearance of a wild boar. Living on the banks of the rivers, it is per-

petually plunging with great agility into the water, where it remains for a considerable time; it is web-footed, and feeds mainly on aquatic plants. The Guaranis call it the *capybari*, its Spanish name is *carpincho*, and it is the *cabiai* of the French. The skin is valued; the flesh is perfectly white, but very oily, and although the natives enjoy it, to my idea it is the most revolting of food.

Various sorts of armadillos represent the Edentata. The flesh of these is generally succulent, and there is one kind not at all uncommon in the forests, called *mulita* (*Praopus hybridus*) by the Argentines, that is accounted a choice delicacy.

Like Senegambia, Paraguay can boast of some of the most beautiful and varied birds in the world; the more one becomes acquainted with them, the more there seems to admire in the beauty of their plumage and the sweetness of their song. No family is unrepresented, downwards from the enormous wading-birds such as the *tuyuyu* (*Ciconia maguari*) to the tiniest of humming-birds. But I can here only refer the reader for details to Azara's very accurate account, adding that Vicomte Obert, who is a distinguished ornithologist, is making a collection of these interesting and charming creatures.

It would be hardly possible, I should say, to find another country where the sportsman could find greater scope for his pursuits, the variety is so great; there is the perilous encounter with the huge savage beasts for the adventurous, the exciting chase over the plains for ostriches or for deer, and room for the exercise of the marksman's skill in bringing down the small game. Could Europeans only know what is offered them in Paraguay, they would not be long in resorting to it as eagerly as now they make their way to Scotland or the Caucasus.

Saurians swarm throughout the country, and it is an unfailing diversion for travellers ascending the river from Humaita to Matto Grosso, to watch the crocodiles, basking lazily on the banks, rouse themselves at the approach of a boat, and plunge hurriedly into the stream.

The crocodile of the Parana is the *alligator sclerops*, called locally the *yacaré*. It is strong, and not unfrequently ten feet in length, but by no means so fierce as those of the Amazon

or the Nile. It will not, as a rule, attack a man, but when it is irritated it will exhibit the greatest ferocity. I have seen a victim of the creature's fury who had his arm snapped off, but yet one day, when Henri Rochefort and I were bathing in the Cuxipo near Cuyaba, we caught sight of a crocodile only a few yards away, and, seeing that it was disinclined to move, we began pelting it with stones. It remained, however, for a considerable time motionless, and only when we took our rifles and approached almost close to it did it dive into the river out of our sight.

And very much the same may be said about the snakes. They do not seek an opportunity to attack a man; they slink out of the way at the slightest noise, and, except they are trodden upon or touched, they do not bite. All through my stay I heard of only three or four cases of snake-bite; and yet the snakes of Paraguay are amongst the most venomous that exist anywhere. They include the rattlesnake, the viper, and the cobra. Even in India the serpents' poison is not more deadly; but if there are more casualties, it is mainly because the natives are more incautious. The Paraguayan, although he walks barefoot in the forest, is exceedingly guarded; he shakes the branches and rustles the grass as he advances, the startled snake glides away and leaves him unharmed.

An exception to this ordinary rule is found in one of the very smallest of the entire species, called the *ñandurié*. In the distance it looks as if it might be an earth-worm, and in its greenish-grey colour it has the protective resemblance which makes it hardly distinguishable from the foliage. Instead of retreating, at the first sound it starts up erect on its tail, shakes its head, and makes immediate attack. I have seen one dart at a horse's nostrils. The natives assert that its bite inevitably proves fatal in less than ten hours.

This *ñandurié* may be regarded as the only really formidable ophidian in the region; there is indeed the rattlesnake (called the *cascavel* by the Spaniards and *mboy-chini* by the Guaranis), but the tales that are reported about it may be deemed to be very legendary. It is fat, heavy, and inactive; the noise caused by the horny rings at the extremity of its tail makes its presence known, so that it can be avoided; and even should it show fight

it is easily disposed of, as a sharp blow from a stick will break its back.

The cross-viper (*Trigono-cephalus alternatus*), the *quyryryo* of the Guaranis, is more to be dreaded, because it is more alert; but this, too, if unmolested will not bite. Its poison is said to be more virulent than that of the rattlesnake.

Two other venomous varieties should not be left unmentioned—the *jaraca* (*Leucurus*) and the *ñacanina*. The former of these I have never seen, but I have killed several *ñacaninas*, and found them to belong to the adder tribe. The men of my party told me that there was another sort, but I never came across it. Those I saw were yellow and black; they are of considerable length, and move with great rapidity.

This is, moreover, a land of boas. Enormous as they are, they are singularly inoffensive. No doubt that if provoked they could break a man's backbone, just as a crocodile would, but an accident is quite rare, as their size makes them so conspicuous that they are not likely to be touched unawares. The natives call the creature *curiyu*, and declare that the mere prick of any sharp weapon will cause it to abandon its prey. I have had no chance of trying the experiment, and only repeat what has been told me.

But while it may be granted that it is no difficult matter to keep free from a boa on the land, it is a much more serious thing to be exposed to the attacks of the huge water-serpents of the Murina tribe, known in the country as the *mboy-yagua* (serpent-dog). They will upset canoes, and drag bathers down into the water. The Indians have an intense horror of them. During my exploration of the Ygatimi, I saw one cross the river a little way ahead of our boat, and I am confident it was not much under ten yards in length.

Were it not for the hideous noise made on the summer nights by the toads, I might have passed them over in silence, but they made a permanent impression on my memory, and yet they are quite inoffensive creatures. Amongst other noisome things, too, I must include an enormous spider, the *ñandu cavagu* (horse spider), which is said to be extremely venomous.

Of the fish it must suffice to say that they form one of the most valuable food products of the country. The *dorado*, the *paca*, the *surubi*, and the *sabalo*, are all delicate enough in flavour to suit the most refined taste. Some of them, being armed with strong jaws, are a source of danger to swimmers; amongst these are the *palometa*, the *armado*, the *bagre*, and the *prañha*; they abound most in the vicinity of towns, where they gorge themselves with the refuse that is thrown into the river; and in the neighbourhood of the *saladeros*, where the preserved meats are prepared, they congregate in shoals; and I have been told that at the factory of M. Cibils, on the Upper Paraguay, an ox venturing out too far would be defenceless, and certain to be devoured.

The ray, likewise, is an undesirable neighbour. It has a long spike, with which it can inflict a wound which sometimes proves extremely difficult to heal. I have several times been hurt in this way, and have found considerable benefit from the use of permanganate of potash.

My brief zoological summary hardly ought to be brought to an end without my mentioning the invertebræ. Their variety is infinite; but little, it must be acknowledged, is known of them at present. Collectors are beginning to study them, but it must be years before the classification can be complete.

It is sometimes said that the innumerable insects render residence in this country impossible. No doubt it is quite true that whoever ventures into the wilds of the Chaco, or into the dense forests, must be quite prepared to endure a vast amount of torment; the flies, the gnats, the pests of all kinds, *garapes*, *bichos colorados*, *piques*, *uras*, and the like, will persecute him with exasperating perseverance, and not leave him a moment's rest; but if he will keep to the cultivated districts and settle down to a colonist's life, he may be free from all such annoyance, and I speak from experience.

THE CLIMATE.—All the preceding observations about the conditions of animal life generally in Paraguay might make it possible to draw some *a priori* inferences as to the nature of the climate and its physical aspects, but apart from specula-

tion, M. Mangels, who has long resided in Asuncion, has made a number of definite meteorological observations which I have been able to compare with my own.

According to Mouchez, Asuncion is situated 253 feet above sea-level, an altitude which is nearly the same throughout the country, except that it increases gradually towards the N.E.; but the summits of the Eastern Cordilleras rarely exceeds an elevation of 1600 feet. The general declivity of the basin is very slight; in fact, Cuyaba, the capital of Matto Grosso, in lat. $15^{\circ} 36'$ —that is, 10° north of Asuncion—is only 670 feet above sea-level (according to Vogel), indicating a gradual slope of only about 40 feet to a degree, which of course is barely perceptible. The barometrical pressure recorded at M. Mangel's Observatory, at an elevation of 270 feet, varies between 29.134 and 29.138 inches.

The temperature is not, as a rule, subject to any sudden variation. During the summer months (December, January, and February) it ranges upwards from about 55° Fahr. to 100° Fahr.: only twice have I known it to rise to 104° . In September, 1886, the highest temperature was 94° F.; in July, that is, in the winter, it occasionally falls to about 40° , but during the daytime it is frequently 86° . Two or three times during June I have noticed slight hoar frost in the morning; and on low ground, where it is somewhat colder, it has happened that the sugar-cane plantations have been touched by them. Such frosts, however, are very rare.

Out of the twelve months there are nine in which it may be said to be perpetual spring, and although the three other months are undeniably hot, it is not with the torrid fierceness of many parts of Asia and Africa, nor even with the intensity of that heat which is experienced in Venezuela and the Guianas. Moreover, a week seldom passes without heavy rain from the south, which is ever followed by a lower temperature. The heat is not parching to the extent that it is known to be further north towards Matto Grosso and the Amazon.

In August and September the rains begin, the average fall during September for the last nine years being 3.89 inches; for October in the same period the record was 5.72 inches. In

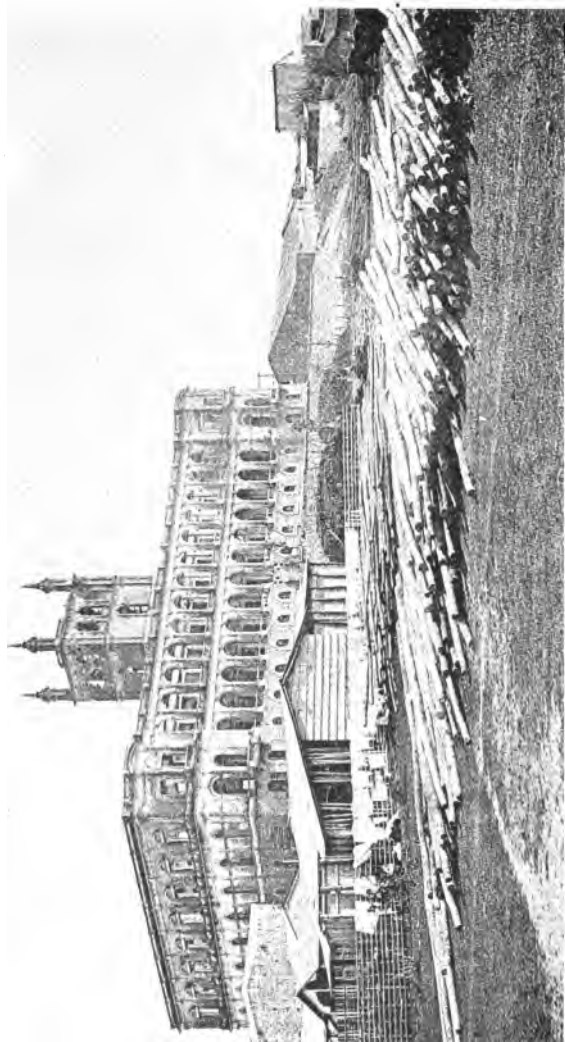
1888 the average was exceptionally high, being 6·38 inches and 7·95 inches, for September and October respectively ; but, on the whole, the season is not to be compared with what is called the rainy season in the tropics.*

In an article in the *Revue du Paraguay* (April, 1888), I have already expressed my conviction of the salubrity of the country. Except smallpox, which is diminishing since the introduction of vaccination, there are no epidemic disorders : neither is there any malaria, except in the almost uninhabited districts towards the east, where an intermittent fever called *chucho* is prevalent. Endemic complaints are hardly known, and the cases of phthisis that have come to my knowledge are very rare. On the other hand, rheumatic affections of various kinds, disorders of the blood and stomach, and anæmia, are far from uncommon ; these, however, may be mainly attributed to the defective sanitary arrangements ; the people sleep in draughts, are insufficiently clothed, and badly fed ; but I am certain that any European observing hygienic rules might be altogether free from alarm. I mean to publish the result of my own medical observations, and believe that they will tend to substantiate the assertion that Paraguay offers a promising field for emigration, the climate being both temperate and healthy, a combination that is not always found. I shall be gratified if my representations prevent my fellow-countrymen from being daunted by the fate of those who have been the pioneers in the way of discovery, and if I can encourage them in their resolution to persevere, and open up fresh scenes for commerce and for agriculture.

MINERALS.—The nature of the surface soil, as distinguished from the general geological features of the country, will be treated later on. I need only say here that an enumeration of the different minerals that are found would be very tedious. Suffice to say that Paraguay, the northern part of which, as far as lat. 22°, is covered with limestones, whilst the south belongs to the sandstone formation, forms one huge mass of

* According to another set of observations the mean annual temperature of Asuncion is 72·3° F. (January 79·2, June 63·3) ; the annual rainfall amounts to 46 inches distributed over 85 days.—*Transl.*

ironstone and manganese. Iron abounds everywhere. Marble is abundant in the north, just as iron is in the south. Mines have been opened and worked in the time of Lopez. Pyrites are found in abundance. I have myself found considerable veins of copper ; kaolin reveals itself in many districts, and I feel certain the sandstone will prove to be bedded with coal, a commodity in which this fine country has hitherto been supposed to be deficient. The volcanic phenomena will be dealt with in a separate work.



E. Mon. Xaurrit et C^{ia}, Paris.

THE PALACE OF LOPEZ AT ASUNCION SEEN FROM THE PORT

PART II.—SOCIAL LIFE.

CHAPTER I.

GOVERNMENT AND LAWS.

Recent form of Government—Authority : legislative, judicial, and executive—
The provinces—Foreign relations—Provision for education—Religion.

THE existing Constitution of Paraguay dates only from 1870. At the close of the terrible war that for five years had desolated the unhappy country, a constitutional assembly was convoked which organized the government in its present form.

Marshal Lopez, the blood-stained hero of that dark period in the annals of Paraguay, died under arms at Cerro-Cora, on the 1st of March, 1870 ; the remnants of the vanquished army were scattered, its leaders being nearly all wounded or taken prisoners ; the residue of the population, consisting mainly of women and aged men (for even the boys had fallen fighting bravely to the last), were perishing with hunger in remote hiding-places in the forests. The conquerors marched onwards, occupying the towns, and taking possession of all the land. Paraguay failed for awhile to be rich and flourishing, and of Lopez's gallant army and fine navy scarcely a vestige remained. No invasion of barbarians such as ravaged Europe in the early centuries could have wrought more ruin or entailed more misery. Nothing seemed left, except that the conquerors should permanently assert their authority on the soil that they had over-run.

Paraguay, however, was destined to recover from the terrific shock. A few devoted men had the courage to resist the further encroachments of the allies. Meeting at Asuncion, they formed a triumvirate which undertook the task of re-organization ; they succeeded in obtaining a treaty of peace, and on the 15th of August, 1870, they were enabled to hold

a meeting, and to proceed to draw up a Charter for the new Constitution.

The principles then adopted have continued in operation ever since, and although seven presidents in succession have subsequently held the reins of power, there has been no modification whatever of the fundamental compact that was originally made.

Liberal in its policy, the new Constitution abolished all the restrictions with which former governments had embarrassed the country; the navigation of all the rivers was declared henceforth to be absolutely free, and natives and foreigners alike were to enjoy the privilege of entering or quitting the Republic without passport or impediment; and the frontiers being thus opened, the country, with all its interests, was for the first time brought into free communication with the rest of the world.

Unfortunately, the echoes of the dreadful war continued to repeat themselves in Europe. The alternations of the struggle had been watched with considerable interest, and when the announcement of the great catastrophe was received it produced an impression that the country was absolutely ruined. Thus, notwithstanding the enlarged facilities for reaching Asuncion, comparatively very few travellers between 1870 and 1880 ventured so far as the Rio Paraguay. Consequently, the real condition of the people remained almost unrecognized in Europe, although there was going on amongst them one of the most signal examples which the whole range of political records can show of what can be done by perseverance, in re-organizing and reforming what seemed to be fatally overturned.

The resources for this new organization were apparently utterly wanting. There were no national industries, for the men had perished in battle; there were no rights in landed property, as every title-deed had disappeared; there was no commerce, because the merchants had forsaken the country in despair; and as to the poor produce that could be extracted from the soil, it was all laid under contribution, and monopolized by the army of occupation. So great and various were the difficulties in the way, that it might be suspected that the

cradle of the new constitution was haunted by an evil genius, exercising the most malignant influence.

Before all things it was necessary to restore tranquillity to the public mind, and to allow the people to recover their equanimity, and to fill up the gaps in their numbers which had been made by death. They wanted fresh moral discipline. In this direction, matters seemed in a degree to right themselves, the authorities, in truth, being men of not sufficiently high standard to deal adequately with the task.

The Constitution, however, proved itself effectual in establishing three great powers in the State: the legislative, the executive, and the judicial.

Of these, the legislative comprises a Chamber of Deputies and a Senate, both elected by universal suffrage. Each of these bodies has power of passing laws, but matters relating to finance are confined exclusively to the Chamber.

The executive power is in the hands of a President, who is appointed for a definite term of four years, having five responsible ministers associated with him.

The judicial authority is one of the most important of the State agencies, and it is one of the glories of South America that it has been maintained in its full dignity and independence. It has been known to make effective resistance to demands of the Executive which have appeared arbitrary, like those of the Argentine Confederacy, which, under the name of a republic, bears the obvious characteristics of an actual autocracy. It is represented by a Supreme Court of three members, and by five judges of Inferior Courts, of whom two deal with civil causes, one presides over criminal cases, one is assigned to cases of misdemeanour, and the fifth arbitrates in all matters connected with trade. An Attorney-General, a Public Prosecutor, and an Advocate-General complete the administrative staff.

Such is the machinery of the central government of Paraguay; its merits lie in its great simplicity, which is itself a security for the proper discharge of its functions.

In the Provinces, the law is administered by subordinates, who are a sort of prefects, dependent on the Minister of the

Interior, and by magistrates who, as Justices of the Peace, are under the jurisdiction of the higher legal authorities.

In addition to the State authorities, and absolutely independent of it, there are Municipal Corporations, possessing considerable liberty of action. The members of these corporations, being elected by a direct vote of the people, represent the interests of their constituents, and administer the funds accruing from the local imposts.

These municipal communities are called *partidos*. As centres of judicial action in their several districts they may be said to constitute, in their autonomy, the basis of the political system of the country. The division of authority ensures an absolute independence, and, at the same time, preserves individual liberty. There cannot be any uniting of these *partidos* into groups, because each is dependent solely on the central power. The 23 "districts" recognised by the Constitution have no administrative character, but are simply electoral districts.

It thus becomes manifest that the Constitution of Paraguay approaches very closely to a system of decentralization. In matters that have merely a local interest, the influence of the central authority is scarcely felt at all, the municipalities enjoying a freedom of action that is practically unlimited. Alike for the son of the soil and for the settler there is the fullest guarantee for liberty in all personal concerns. The constitution, in fact, allows foreigners the rights of voting in all these municipal elections, and not only does it authorize them to hold municipal office, but even enjoins upon them the obligation to do so if properly elected. Thus, without forfeiting their nationality, or being compelled to mix themselves up in electioneering struggles, they may yet have a share in the management of the affairs of the place of their settlement, in which their closest interests may be concerned. On the other hand, they are protected from all the evils that may arise from any political disturbance. What more could any Government do to ensure at once for a stranger in the land his security and his liberty?

It may give an illustration of the advantages offered to Europeans in the manipulation of their own affairs if I quote

an article from the Act of Concession for the Transcontinental Railway between Asuncion and Santos:—"The colonists," it provides, "of the new villages established along the route will enjoy the following rights: as soon as the residents amount to 50, they shall proceed to elect five of their number, who shall be invested by the executive with municipal functions. At the same time they shall nominate three 'good men and true,' one of whom shall be selected by the Government of the Republic to be a justice of the peace for the new settlement." Could more consideration be shown? No further obligation to the State is incurred beyond a poll-tax of 4 shillings for the education of their children, so that the outlay on the part of emigrants is reduced to a minimum, while their independence is complete.

PUBLIC EDUCATION.—The present Government takes an especial interest in the matter of education. Under Lopez it was very little that was done in this direction, but even that little was reduced to nothing during the period of war, so that the present generation has grown up in a state of neglect and ignorance. According to the Statistical Year Book of 1886, only 14 per cent. of the population of Paraguay could read and write, even this number including all the children attending school when the estimate was made. Aware of the true state of things, the Government, in 1881, during the presidency of Gen. Caballero, took up the matter, and made education compulsory, and, once enforced by law, it has made a fairly successful progress.

Within a year after the passing of the law, there were 175 public elementary schools, attended by 6782 scholars; in 1891 the number of schools was 292, the number of scholars being 18,944, an advance that testifies to the beneficial working of the Act of 1881, in spite of the difficulties of communication and the sparseness of the population. Fresh impetus is still being given to the cause, a new education bill has become law, and there is good promise that Paraguay, in respect of the instruction of her children, will in due time rise to the standard to the most civilized nations. In addition to the annual grant of nearly £8,000 originally made in 1881, there has since been

included 10 per cent. of the rents of all public lands and yerbaes, all fines, the produce of all escheated estates, $\frac{1}{2}$ per cent. on the proceeds of all sales by auction, which, together with the capitation fee already named, made the total levy for 1890 to come up to about £63,000. This later Act provided also for the appointment of a Board of Education, which has now been for some time working with much energy.

Besides the Government schools, about a hundred private schools have been started and are subsidised by Government; in Asuncion alone, in 1887, there were five of these free for boys, and nine for girls.

As yet, secondary education cannot be said to have made much advance. A few establishments there are which are well attended, the most important of them being the National College, the Seminary at Asuncion, and the College of Father Mahiz at Arroyos y Esteros.

The National College has a staff of 15 Professors, some of whom are Paraguayans, although the majority are drawn from Europe. The seminary is under the direction of the Lazarist Fathers, with a Frenchman, Father Montaigne, at the head. A scheme is in contemplation for opening a Girls' College in Asuncion, and the Education Board have decided on establishing secondary provincial schools at Villa Concepcion, Villa Rica, and Villa del Pilar.

So considerable has been the outlay in which the State has been involved by these efforts, that it need hardly be said that it has hitherto been impossible to effect much in the way of higher education; yet something has been accomplished, inasmuch as courses of law lectures have been delivered at the National College. The leading lawyers of the town, and the principal members of the Superior Court, all of whom hold legal degrees in foreign universities, undertook the office of professors, with the result that all the lectures were attended with an eagerness that promised well for future success, and demonstrated the existence of a real desire for intelligent study.

Another institution that has been established is a high-class Training College, which all teachers in elementary schools are required to attend for a year. Two professors, for men and

women respectively, have been engaged, one from North America, and one from Europe, and certificates of qualification are granted to such teachers as pass the prescribed examinations.

No doubt much still remains to be done in the promotion of public education, yet, when the results already attained are considered in relation to the difficulties with which the subject has been surrounded, we cannot do otherwise than agree with Sarmiento, the great promoter of public schools in America, who maintains that the progress of education in Paraguay is very praiseworthy.

Although Roman Catholicism is the recognised religion of the State, and there is a large Training College for the theological instruction of young priests, yet perfect liberty of worship is guaranteed by the Constitution.

In the time of Lopez there were as many as 103 parish churches in the Republic, but this number has been considerably diminished since the outbreak of the war, and it is now no uncommon thing to come across these buildings in a state of desertion and desolation, half hidden by the branches of the forest trees that have grown round about the ruins. In the more populous parts of the country, the buildings have been carefully restored, but the number of renovated churches remains very limited, and is quite inadequate to the requirements of the population.

For some years past, since the English and German immigration, a Protestant Church has been built at Asuncion, in connection with which a mixed school has been opened.

CHAPTER II.

FINANCIAL POSITION.

State of exchequer under Lopez—The loan of 1871-2—Exchanges of London and Paris—The mission of Don J. S. Decoud—Regulation of home and foreign debt—Taxation—Present resources—Prospective revenue.

UNTIL 1866, that is, previously to the war of the triple alliance, the finances of Paraguay were in a condition such as few nations could boast. The concise description given by Col. Du Graty speaks for itself:—"The state has no debt, and there is an ample reserve of specie in the exchequer."

This propitious state of things might, in all likelihood, have been maintained indefinitely, had not the fratricidal war, which armed three great nations against Paraguay, brought desolation over the land. When peace at last was concluded, Paraguay was left bankrupt. Not only were the survivors of the five years' struggle homeless and destitute, without means to get the common necessities of life, but there were the conquerors to be indemnified, the army of occupation to be supported, and the country itself to be raised from the deplorable depth into which it had been cast by its misfortunes.

It was a difficult task. Many hardships had to be borne, and many vicissitudes had to be passed through before there could be the attainment of such comparative prosperity as the State now enjoys. The record of the struggle against adversity is instructive, as illustrating the financial progress and the value of the resources of South America.

In front of all there was the necessity to find a creditor somewhere, who would advance to the Government a sufficient capital with which it could make a commencement of the work of revival.

It was obvious at once that it was from Europe alone that any chance of success could be anticipated; the American

market was dull and incapable of raising a loan for the purpose, and, to say the truth, the outlook from Europe was not very cheering, as the Franco-German War had barely come to an end. But although the difficulties were considerable, they were overcome, and England took up the application, a result which was accepted as a favourable omen, as it proved that Paraguay, in spite of all her disasters, had not lost her credit.

No European stock-market to the same degree as London has appreciated the vast resources and future development of the States of America. There may be some initial difficulty to overcome, or some crisis to survive, but England has ever been regardless of a risk that is temporary, and prepared to await a recompense that may tarry, but appears to be sure. Almost all the smaller American States are in her debt; almost all at some time or other have failed to meet their obligations, but there is not one of them that has not paid large interest to its patient creditor. No other European market has so accurate an appreciation of the capabilities of America, and it is this which gives England so powerful a hold in the New World, where she disposes of large consignments of her products.

The different estimate of France and England as to the desirableness of American securities, is declared by the fact that while the advances of England have reached a total over £405,000,000, those of France are considerably under £30,000,000. I do not hesitate to say that the error in judgment attaches to France.*

* Approximately, the existing loans made respectively in England and France are thus represented:—

	ENGLISH.	FRENCH.
Argentine Republic.....	£103,560,000	£14,360,000
Brazil.....	80,400,000	7,560,000
Mexico	80,400,000	640,000
Peru	36,200,000	
Uruguay	26,080,000	
Chile	17,000,000	
Venezuela	9,560,000	600,000
Central America	11,400,000	
West Indies	3,800,000	1,360,000
Columbia	3,840,000	
Canada		3,320,000
	£372,240,000	£27,840,000

England, then, it was that came to the relief. At two separate dates, in 1871 and 1872, Paraguay was enabled to contract loans in London amounting together to £1,438,500. The rate of interest was 8 per cent., with 2 per cent. premium on redemption.

It was a sum of vast importance to a country in such a dejected condition, and ought to have sufficed to bring about a real alleviation of troubles; but by a series of misfortunes, arising mainly from the occupation of the country and the difficulties of communication, which were wilfully aggravated, only a small portion of the specie, £200,000 at most, ever reached the Treasury of the State.

Paraguay was far too weak at the time to make any effectual protest in London, and had no alternative but to submit to the adverse circumstances. For two years the interest was forthcoming, but in 1874 all resources were found to be exhausted, and, crushed by the very loan from which it had looked for relief, the country was compelled to suspend payment.

No word of reproach was breathed; it was known that in the effort to meet its liabilities the country had made every sacrifice, even to the neglecting provision for its immediate necessities.

Eleven years elapsed without any improvement of the situation; every struggle to rise proved more than useless, and so straitened became the position of affairs that in 1874 the Treasury could not meet the claim of a bank for £10,000; and in 1882 a refusal was made on the Buenos Aires Exchange of a loan of £50,000.

The condition of things was rapidly becoming desperate when Gen. Caballero came into power. Under his adroit administra-

	ENGLISH.	FRENCH.
Forward.....	£372,240,000	£27,840,000
Ecuador.....	2,680,000	320,000
Bolivia	1,560,000	
Paraguay	850,000	
Advances common to N. and S. States	27,720,000	
Total,	£405,050,000	£28,160,000

Out of this £28,160,000 contributed by France, £3,000,000 comes from Brussels.

tion confidence began to be restored, and it was owing to the measures adopted by his ministry that the country found itself in the right track for once more recovering its equilibrium. It is true indeed that there were only few of the citizens who at the time understood the import of the measures which were being taken, and it is only recently, after success has been achieved, that there is any due appreciation of the ability by which those measures were revised.

Manifestly the first thing to be done was to come to some arrangement about the debt to England. For this purpose, at the end of 1885, Don J. S. Decoud, the Foreign Minister, was commissioned to go to Europe, where he accomplished the object of his journey with singular success. Satisfied entirely as to the good faith of the Paraguayans, the English bondholders consented to a reduction of the capital of the debt by nearly 50 per cent., so that, by the deed of covenant signed on Dec. 4th, 1885, its amount was brought down to the sum of £850,000. Upon this the interest to be paid for the first five years is 2 per cent., for the next five years 3 per cent., and subsequently 4 per cent. until the extinction of the debt, the redemption of which commences in 1897, and proceeds by the operation of a sinking-fund of one-half per cent.

The new contract has been duly met. The national funds have been equal to the demand, and in the two half-years of 1887 the stipulated sum for interest was punctually remitted, and a corresponding regularity has been maintained with regard to the payments of 1888 and 1889.

To meet the claims for the unpaid interest which had accrued for the fifteen years between 1871 and 1886, it was agreed that a large transfer of State lands should be made to the bond-holders, and as this was done to the extent of 500 square leagues (2,150,000 acres), it will be seen, from the figures that will be given later on, that the creditors did not by any means make a bad bargain. At present, land may be reckoned as being worth about £700 a league, which brings the value of the transfer to £350,000.

The London proprietors of the conceded territory have recently formed a company (The Paraguay Land Co., Limited),

to promote its colonization and cultivation. In English measurement it is considerably over 3,000 square miles, and if the value of land in Paraguay should increase as it has done in the Argentine Republic, this enormous property will be worth a colossal sum, and will remunerate its owners far beyond their anticipations.

From the compromise with regard to the debt, it resulted immediately that attention was drawn to Paraguay, fresh capital was attracted, and its foreign credit improved; the consolidated loans of 1871 and 1872 are quoted in the European markets at 44, a price which cannot be considered otherwise than fair, when it is taken into account that as yet they are paying only 2 per cent.*

The foreign debt is inclusive of the indemnities to be paid to foreign subjects who suffered during the war; reckoning the arrears of interest, these amount to over £3,000,000, (18,564,764 pesos); but it is understood that these indemnities are to be paid only when the resources of the State are adequate to meet them without prejudice to the progress of the country, so that the liability may be regarded as of secondary moment.

Beyond this, again, Paraguay is indebted to the Brazilian Government for a guarantee fund for the railway which had to be reconstructed, the one previously existing having been destroyed by Lopez; but by an arrangement made between the Government and the Commercial Bank, the Bank discharges the obligation, and the State is no longer directly responsible.

As to the internal or home debt, it may be said that it was comparatively insignificant, and has become a thing of the past, having been now completely discharged. In 1888, this home debt consisted of various bills of exchange outstanding to creditors to the amount of about £36,000, and of certain bonds that remained from an issue in 1885, now reduced to under £3,000; besides which there were the bonds known as *Títulos fiduciarios*, which had just been created for the redemption of the Asuncion and Paraguari Railway, from Messrs. Travassos, Patri and Co. These bonds, to the extent of about £240,000, were well taken up by the public, and have helped in the establishment of a Bank of Commerce, the operations of which

* In February, 1892, the Paraguayan loan was quoted in London at 31½.

have largely contributed to the financial development of the capital. These bonds are being redeemed by the imposition of an extra duty of 8 per cent. on all dutiable imports, and are already so far paid off that only a balance remains, which will most probably be cancelled in a year or two; they may be regarded now not so much in the light of an obligation as of a lucrative investment.

Moreover, in May 1889, the Government sold the railway to an English company for £420,000, an operation which has given them the use of their capital without waiting for the completion of the line.

Thus, altogether, the statement is borne out that all home debts in Paraguay have been extinguished; and the rapidity with which they have been discharged is a proof of the financial energy of the authorities, who have persevered under General Escobar in following the economical traditions of General Caballero, and have made it clear that the resources of the State are quite adequate to meet the demands upon them.*

After this review of the national liabilities, we may now proceed to specify the main sources of the national revenue. These may simply be classed under the heads of ordinary and extraordinary.

The ordinary revenue is nearly wholly obtained from customs dues. Apart from these, there can hardly be said to be any taxes in Paraguay, inasmuch as stamp-duties, patents, harbour-duties, postal charges and the like, are all so moderate, that they constitute no appreciable burden for the people. They amounted in 1885 to \$64,761 (£12,910), and rose in 1890 to \$215,160 (£43,032), an increase that attests a very satisfactory growth in the commercial transactions of the country. And this hardly represents the true state of the case, because a new law had meanwhile reduced the stamp-duties, so that the proceeds from them were only half of what they otherwise should have been.

The customs duties increased from \$926,544 (£185,309) in 1886, to \$1,183,426 (£236,685) in 1890.

* On January 1, 1891, the external debt amounted to 23,701,045 pesos (including the consolidated English debt of £844,050). The internal debt at the same date was 724,485 pesos. Total, £4,885,106.

In 1890, the ordinary revenue of the country thus amounted to \$1,398,586 (£279,717).*

This may seem an insignificant sum ; but, granted that it is so, it yet leaves the inference, which is very obvious, that the population is so far from being overburdened, that it could at any moment be made to produce a much more considerable contribution. The taxation per head contrasts most favourably with what exists in other quarters of the world.†

Amongst the ordinary sources of the State Revenue should also be included the sums realized from the letting of woods and lands, and the profits that accrue from special commercial enterprises.

The rents received from the woods and yerbaes vary in amount, as the yerbaes yield a harvest only once in three years. Thus in 1885 they amounted to only 22,821 pesos, as compared with 31,971 pesos in the year after. The commercial undertakings in which the Government is involved are the National Bank, the Railway, and the National College ; the Bank in 1887 yielding a profit of £12,163, and the College about £16,247, whilst the surplus of receipts over expenditure on the Railway had all to be laid out in the reconstruction of the line.

Revenue that comes under the definition of "extraordinary," may be said to be derived almost entirely from the sale of public lands.

When arrangements were concluded about the English Debt, the State at once resolved upon the sale of the "yerbaes." It was a measure to which undoubtedly the country owes its revival. There are those who severely criticise the step that was taken, and maintain that the land was sold at too low a price. The criticism is out of place. The sale was a success, and to complain of it was only like blaming a general for destroying only three-fourths of the enemy when he might have annihilated the whole. It is a question of victory, not of slaughter.

Before the settlement with the English bondholders, and

* In converting pesos or dollars into English currency, the peso has been assumed to be worth 4s. Its actual value does not exceed 3s.

† Statistics prove that, reckoned in shillings, the taxation per head in Uruguay is 136s. ; in the Argentina, 116s. ; in France, 98s. ; in England, 49s. In Paraguay it is only 16s.

previously to the passing of the enactment by which the State lands should be put to auction, the whole of the lands were locked-up capital, dead and unproductive. Not a purchaser could be found who would give 200 pesos for a square league. No sooner was the act in force than buyers were found ready to give 1,200 pesos per league, a price which has gone on increasing, until now, as the land passes from owner to owner, it fetches from 2,500 to 3,000 pesos. It may well be asked whether this does not prove that the low price demanded at first was a successful bait, and that it brought about the result of capital flowing into the Treasury, and cultivation being given to the soil. And the benefit is mutual; the people have experienced a general revival of business; the State has been furnished with means for securing prosperity.

Purchasers of Government lands have to make their payments in four annual instalments, the first being made on taking possession. The receipts from this source up to the beginning of 1891 amounted to nearly £980,000. They are for the most part devoted to public works, amongst which must be included the extension of the railway from Paraguari to Villa Rica (£280,000), the construction of a harbour, the erection of barracks, of a Parliament-house, a Custom-house, and a theatre, as well as the paving of the streets of the capital, and the improvement of the public highways.

What Paraguay has not been able to do during the 13 years that she lacked the credit so universally denied her, she has now been able to accomplish from her own resources, wise administration, and right appreciation of her position. One fact stands prominently forward; all her measures have been directed to the single point of utilizing her resources, so as to stimulate the business capabilities of the people, which had become dull and stagnant. Indifferent to the accusation that she was alienating the patrimony of the sons of the soil, she only surrendered what would provide them with the capital which was indispensable for their material advancement; and now, instead of their credit being nil, they can command such resources as they need.

Recent financial operations satisfactorily prove that such is the case.

CHAPTER III.

REAL PROPERTY.

Origin of property—Causes of depreciation in land—Government measures to raise the price—Public lands—Land speculations—Solidity as a basis—Difference from Argentine Republic—Future value—Classification of lands—Town-lands—Mortgages and Banks.

THE existing condition of property in Paraguay may well claim the attention of economists. It is the basis of the public wealth, and the chief factor in the carrying forward of the progress of this interesting country.

After the war it was found that nearly all the archives, public and private, had disappeared, and something had to be effected, as best it might, to make good the loss, just as it had been the case in France after the war in 1870. The scheme that was adopted was to allow all those who were in a position to make a claim to demand secondary titles (known as *titulos supletorios*), documents that should be reckoned valid as establishing the right of proprietorship. So wide-spread, however, had been the ravages made by war and sickness, that large numbers of families had gone entirely out of sight without leaving a claimant, in consequence of which their holdings reverted to the State. Always very considerable, the State territory was thus extended to such large proportions that the bulk of the country became national property, a condition of things that proved very burdensome, inasmuch as Paraguay was practically bankrupt, and wanting in the means to cultivate the soil that thus accumulated on its hands.

In earlier times it had been otherwise. Under the government of Francia and of Lopez the landed property of the commonwealth had been the chief, if not the only source of the national well-doing. In Francia's time, the State was master of everything, and the nation was supposed to be altogether

independent of the outside world ; the property of the State brought in a marvellous revenue ; the public lands were covered with *estancias*, all rich in cattle ; and subsequently, under Lopez, the vast crops were cultivated as well, so that the entire revenue thus accumulated was enormous. There was no taxation of the people, and few countries could be accounted so wealthy ; but at the same time there was this difficulty, that the State was the most formidable rival of the small proprietors, who, with their limited capital, had no chance of competing successfully with the ruling powers. Things were altogether changed when the war had wrought its mischief ; the Government lands ceased to have their old advantages, first, because the establishment of free trade opened the way for private efforts, which had hitherto been paralysed by competition with the State ; and, secondly, because the State itself had no money with which to carry on the cultivation of the lands.

The circumstances were such, that public property was doomed to disappear ; yet so miserable was the condition of the country, where families were dwindling away in poverty, that it seemed impossible to find other owners for the land. Who was there to undertake its cultivation with any prospect of making a profit ? The problem before the Government was hard to solve.

For some years, it must be owned, the problem not only remained unsolved, but few administrations gave it any serious attention at all. At length, in 1885, under the presidency of Gen. Caballero, the matter was taken vigorously in hand, and measures were adopted of such practical efficiency as to bring about the present economical conditions of the country.

At that date, the Argentine Republic, under Gen. Roca's presidency, had just been developing a system which had made their land bring them in enormous wealth. Why should not Paraguay follow the example of her successful neighbour, and utilize her own land in the same way ? To carry out this policy two things were necessary ; first, to let the land be offered on acceptable terms ; and, secondly, to provide that the credit of the country should be so redeemed that the value of the offer should be enhanced. At once two measures were passed

by the Government to meet the occasion ; first, a bill to sanction the sale of the public lands ; secondly, a commission to Don J. S. Decoud to proceed to London to come to an arrangement with the creditors of 1870 ; the two being so closely connected that the success of the second depended upon the carrying out of the first.

The Land Bill was passed on the 7th of July, 1885, and in the ensuing winter Don J. S. Decoud effected his financial projects, arranging the Paraguayan Debt by inducing the bondholders to accept 500 square leagues of land. This land, hitherto worth nothing, thus became in a day the basis of future national prosperity ; Paraguay rose up from her helplessness, with her credit restored, the value of her territory enlarged, and her prospects bright and encouraging.

According to the provisions of the Act, the public lands were divided into five classes, corresponding with their situation and natural fertility, the scale of prices descending from 1,200 pesos (£240) a league for the best, to 100 pesos (£20) for the most inferior.

As an immediate consequence of the action of the Government and the acceptance of the proffered land by the English bondholders, the market at Buenos Aires began to take a keen interest in the transactions. Argentine land had advanced to so high a value that large capital was required for very restricted investments, and the maximum price that it had reached shut out the prudent speculator. At once there was a rush to Paraguay, which had better and cheaper land to offer, and purchases were made with ever increasing rapidity ; the smallest lots of public land were eagerly taken up, so that not a league is left for further sale. The land sales which are at present being effected are only at second, fourth, or even fifth hand. Various companies have been formed, and syndicates have been started, such as the Paraguay Land Co. and the Territorial Bank, which are still maintaining an active business.

This movement must not be regarded in any way as a wild speculation ; on the contrary, it has never exceeded the reasonable limits which the prospective increase of the value of the land sufficiently warrants. In corroboration of this, it should

be enough to compare the price originally obtained in Paraguay with that which is now quoted in the Argentine Republic and in European markets.

Corresponding with the prices of the square league already specified, the primary price of a hectare (which is about $2\frac{1}{2}$ English acres), in the five classes of land respectively, would approximately be 64, 42, 16, 11, and 5 cents, *i.e.*, 2s. 7d. for the best, and only $2\frac{1}{2}$ d. for the cheapest, an item so insignificant as scarcely to be taken into account in the cost of investment. Purchases, of course, are no longer to be made under any such conditions, but all the advance that has been made still leaves the land, in proportion to its productive qualities, at a price extremely low. These prices refer only to pasture and arable lands that lie at considerable distance from the chief centres (say beyond a radius of 10 miles from Asuncion, and of 3 miles from smaller towns), because in the immediate vicinity of towns market-gardening will be so profitable as to give the land an exceptional value.

Value, in general, is not determined by geographical position only, but to a large extent by the length of time during which the ground has been under cultivation. In a country new as this is, the soil becomes rapidly productive, and any plot which has borne the most trifling crop of sugar-cane or lucerne is worth several times as much as a piece of the same extent that has never been tilled at all. There is, for example, an estate called Surubiy, 12 miles from Asuncion, the area of which is about a square league, enclosed in a wire fence, for which 60,000 pesos (£12,000) is asked; while a neighbouring estate, which has hitherto not been put under cultivation, is offered for 20,000 pesos. In estimating land value, it must never be overlooked that labour is everything, and ground, in comparison, is nothing.

At present the conditions are such that, within three or four leagues from Asuncion (at San Lorenzo, Aregua, Capiata, Luque, or Limpio) the price of land varies from 20 to 30 pesos per hectare, which corresponds to £1 12s. to £2 8s. an acre.

Along the railway, between Aregua and Paraguari, the hectare fetches between 8 and 10 pesos. On the River Mauduvira, near Mercedes, a square league has recently been sold for 3,000

pesos, being at the rate of 3 pesos 75 cents a hectare. Around Villa Rica, land is worth 10,000 or 12,000 pesos a square league, or 5 or 6 pesos a hectare. Around Villa Concepcion, land can be had for 3,000 or 4,000 pesos a square league.

Up in the country the land is cheaper still. Originally sold for 800 pesos a square league, it now realizes from 1,500 to 3,000 pesos, the bulk of it fetching 2,000 pesos. This is the price recently paid by the Paraguayo-Argentine Company on the Central Parana, as also along the banks of the Rio Jejuy.

The price of 1,500 pesos per league has hitherto been limited to the territory on the Brazilian frontier and the Sierra Amambay. In the Chaco, where the land was classified as third, fourth, or fifth rate, its price followed the same upward movement. Along the river, from the Pilcomayo to the Rio Verde, it has reached a value nearly equal to that in Eastern Paraguay. Quite recently, below Villa Hayes, opposite *Remanso Castillo*, it has been sold at 6,000 pesos; but in the upper and more remote districts it does not on an average fetch more than 500 to 1,000 pesos per league.

Thus, at the close of 1889, within two years of the time when the law for the sale of the public lands was put in force, the value of the soil had increased at least ten-fold in Eastern Paraguay, and nearly four-fold in the Chaco. If it were only the *time* that had to be considered, the result would appear preposterous, but it becomes quite intelligible when the insignificant cost of the land is compared with the yield of a single harvest, and still more easy to be understood when taken in connection with what is being done in the Argentine Republic. There, in the province of Buenos Aires, where the land is too poor for anything but sheep-farming, its average price is no less than 120,000 pesos per league, equivalent to about £5 an acre. In Paraguay, on the Lower Parana, the lowest price is not less than 20,000 pesos; whilst in the Argentine territory, even in the less densely populated province of Corrientes, of which the greater part is still uncultivated, the least accessible land can rarely be acquired for less than 5,000 pesos. This difference in value is most remarkable, and the more so when it is recollected that the two countries are separated only by the breadth of the

Parana; and that Paraguay is without a doubt more fertile, enjoys a higher temperature, and has a soil more capable of yielding more valuable crops. Moreover, there is every symptom that the price of land in Corrientes has not reached its maximum, so that a yet farther margin remains in favour of Paraguay, and the conviction is strengthened that its soil is destined to realize a higher price than heretofore.

Whence, then, it may be asked, comes this anomaly? How are we to account for the difference in price for land of similar character in neighbouring provinces? The answer is not hard to find. In Paraguay, the sale of public lands began only in 1886; whilst in Argentina it has been going on since 1883. The Argentine Republic is consequently three years ahead.

Anyone who, like myself, has been in the position to follow out the movement, will be quite satisfied that the improvement in the land value in Paraguay is gradual and steady, and may be described as normal. It has none of the characteristics of mere speculation, but has proceeded concurrently with the development of the financial institutions of the country, the importation of specie, and the systematic introduction of agricultural industries. In the Argentine Republic it has been quite otherwise: at Buenos Aires, stock exchange speculations have been carried on to the wildest extreme, so that high pressure in the money market has seriously hindered the pursuits of agriculture; the price of land, instead of corresponding with and following any stable advance in national prosperity, has again and again been forced up only to experience a sudden relapse.

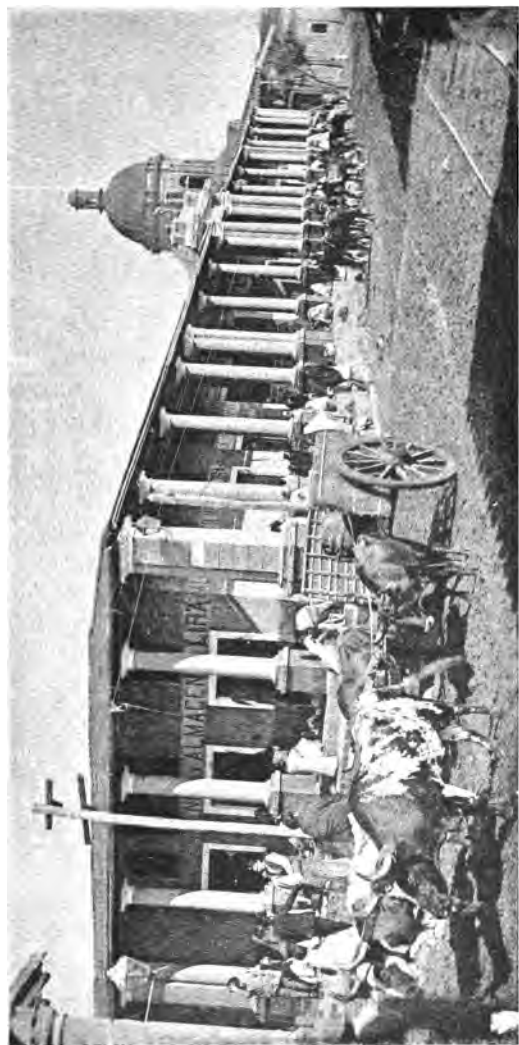
Hitherto, Paraguay has been free from all such vicissitudes. From a bankers' point of view, the country is not sufficiently developed for large financial operations; there is no scope for gambling in stocks, and capitalists have not been sufficiently powerful to monopolise dealings in land. General commerce may perhaps have suffered from this want of capital, but to Paraguay it has proved a real blessing, preserving it from the agrarian collapse which has fallen, and threatens again to fall, upon the Argentine Republic, as the inevitable result of financiers discounting the future revenues of the land.

This is confirmed by the way in which the mortgage banks in the Argentine Republic backed up the land movement. Finding themselves with considerable capital at their disposal, for which there was no corresponding demand, they lent it out freely on mortgages on the land, of which they raised the valuation according to their own pleasure. So long as it remained a matter of *lending*, the proceeding was satisfactory enough; but whenever there was occasion to *foreclose*, difficulties could not be avoided; the money full often could not be raised to meet the obligations that had been incurred, and disaster inevitably followed. The outlook in this respect is still gloomy, because the produce of the soil is as yet very far from being proportionate to the capital that is locked up in it.*

On the whole, therefore, the assertion is completely borne out that it has been for the advantage of Paraguay that her borrowing powers have not been developed, and that financial operations, instead of preceding and forcing on the land movement, will follow after it and give it substantial support.

It has been in Asuncion itself that the sale of land has proceeded most actively, the smallest lots having been disposed of at a reasonable rate per square *vara* of eight square feet, and according to position. The business quarter of the city is adjacent to the port and to the Government offices and banks. At the port itself the space is very limited, and much crowded by emigration agencies; the price of land here was from 30 to

* Written in the beginning of 1889, this paragraph received further confirmation before the year had closed. The firms in Europe that supplied all the capital of the Argentine loans, took alarm at the continuous creation of these land-mortgages or cedulas, and, desirous of putting a check upon speculations that were becoming unlimited, resolved to make no further advances to be employed in this way. The immediate result was to bring about a severe crisis, and the premium on gold reached 130 per cent. The action that had been taken, however, was no doubt to be entirely approved; it was adapted on the one hand to put an end to the gambling that was going on in the Buenos Ayres exchange, and on the other to teach to the adventurous financiers of the Argentine Republic that credit has its limits, and cannot be granted simply on faith; it was the practical way of shewing them that while they were persevering in their schemes of discounting the future, they were incurring the peril of compromising it fatally. Those who are in charge of the destinies of a great country are bound to look beyond the duration of a presidential term of office.



E. Bon, Nouvel et C.^{ie}, Paris

MARKET AND PANTHEON OF LOPEZ AT ASUNCION

35 pesos for a *vara* (eight square feet), and there is now no more to be disposed of. In the streets outside the business quarter the price that is asked is only 5 or 6 pesos, whilst beyond the city proper (*del centro*, as it is called) the land is valued in proportion to its situation. The tendency of the city is to extend in an easterly direction towards the suburb of Recoleta, and this has been encouraged by the construction of two tramways both running that way. Between the city boundary and Recoleta, building plots decrease in value. In the immediate neighbourhood of the city they still fetch from 3 to 4 pesos; at the "Cancha," only 1 to 1.50 pesos; at San Miguel they can be had for 50 to 60 cents., whilst at Recoleta itself they can be had for 25 or 30 cents. It is certain, however, that these insignificant prices cannot continue, because there is much building in progress, and a number of wealthy capitalists are carrying out improvements which will result in the place becoming, like Villa Morra, a popular summer resort.

Next after Recoleta, the most rising suburbs would seem to be La Trinidad to the north-east, and Tucumbu on the river below Asuncion. Associations are already formed for laying down tramways in both these directions, as in a country where heat and dust interfere with traffic, the tramway is an indispensable provision for any urban extension. Eventually it is by no means improbable that the central line of the city may be modified in its direction, because grand projects are afloat of a transcontinental railway, and of an enlargement of the harbour, which would bring all commercial life to the banks of the river.

It should be distinctly borne in mind, that all the figures thus far given can have, after all, only a transient significance; they may be compared with such instantaneous photographs as show a horse in full gallop, or a train in motion. Another moment and the horse is out of sight, the train far away; so it will be with the estimates of land-value; and by the time these figures are circulated they may have become altogether things of the past. But although the actual prices may be changed, the relative value of the lands will remain unaffected; the allotments will all advance in the same proportion, and the devia-

tions will be few from the general lines that I have indicated. And this, as I cannot too often reiterate, will be the result of the land movement not having been inspired by venturous speculations, but having been guided by a reasonable consideration of what constitutes its true value. Paraguay is only now at the beginning of the policy which must determine the worth of her territory, and if what is here written, whilst the first impulse is being given, does nothing more, it will at least record the genuine efforts that were made to secure the future prosperity of the country.

It was not only the arable lands, pasturages, and woods, that the Government resolved to part with in furtherance of the scheme which was to restore the country to a firm financial footing. In the depths of the virgin forests there was a further source of wealth existing,—from vast districts where the yerba-maté abounds, which produces the renowned Paraguay tea. Hitherto the State had been sole proprietors of the *yerbales*, and had let them out at low rents to such yearly tenants as could be found capable of working them; but in 1885, when the bill was passed for the sale of the public lands, a similar Act was sanctioned by Congress that extended to the *yerbales*. The Government was not in a position to give due attention to the maintenance of these tea-forests, and the yearly tenant, eager to make the most of his opportunity, proved so remorseless in the use of the hatchet, that the forests of Paraguay seemed to be in the way of being annihilated as completely as those of the Argentine Republic. For this, the obvious and the only remedy was to sell them; as private property they would be better preserved and better managed than they could be by the State.

One beneficial consequence that followed on the measure was the establishment of several companies which invested a considerable amount of capital that found its way into circulation. Within no long time after the sales had commenced, the "Industrial Paraguaya" was formed, an association which promises to have a large success, its balance sheet for the first year shewing that it had acquired 142 square leagues (960 square miles) of *yerbales*, for about 271,199 pesos, or £54,000, and

that of the second year shewing that its transactions had been doubled. Meanwhile the firm of Patri & Co. had invested a sum of no less than £160,000 in the same way, besides which there had been the numerous purchases of private individuals. The tea-forests have not yet by any means been all disposed of, but remain in the hands of the Government, which surrenders them with the greatest discretion, always submitting them to public auction.

To supervise these sales, the Government has appointed what is called a *mesa topografica*, a board of engineers who are responsible for the survey of the land to be sold; but as these sales become numerous and the difficulty of surveying lands that are only very inaccurately marked in existing maps is great, a proposition is about to be laid before the Chamber to authorize the formation of a regular *corps* of skilled surveyors, who shall carry out all surveys with due precision, as it is obviously of great importance that the boundaries of private property should be accurately defined. In Europe, documentary titles ordinarily make such limits clear, but in South America, everything has to be done from the beginning without any established basis upon which to proceed; and to meet the case I have proposed to establish a series of triangles from all the principal landmarks, forming a network upon which the surveyors may base their work: the matter is of considerable moment, and I believe that the adoption of my suggestion would do away with much of the difficulty which has hitherto been experienced.

Nowadays it seems impossible to manipulate landed property to any large extent without falling back upon the system of Mortgage. Mortgage associations throughout America have worked wonders, and (as I have said) in the Argentine Republic they forced up the price of the land to a hazardous extreme. Such an association was not likely to be long wanting in Paraguay. The "Mortgage Bank," which is a branch of the Paraguayo-Argentine Company, was opened in July 1888, and being formed upon the model of the banks in Buenos Aires, it works upon what is known as the cedula system. I do not wish to be over severe upon this system, which has been so powerful

in the neighbouring Republic, but I cannot resist the impression that it is somewhat onerous to the borrower. Instead of money he receives only a negotiable bill, which is subject to every fluctuation on the exchange; thus an element of speculation is introduced into the transaction, and the mortgage-deed fails to be a safeguard of the value of the property. The paper hitherto has been negotiated at an average loss of 30 per cent., which, however advantageous to the buyer, is deplorable for the borrower. But in new American States, where fortunes are made with a rapidity of which Europeans have rare experience, and where the normal rate of interest is at least 20 per cent., the cedula system has been adopted without hesitation. Money must be had; it is only to be obtained from Europe, and that by offering a good return: such return the South American landowner is ready to make, blindly accepting whatever conditions are imposed, and heedless as to all future burdens it may impose.

As far as I can judge, the cedula system is the resource of impecunious countries; but for wealthy countries I should infinitely prefer a direct loan. Paraguay, I am persuaded, possesses enough solid wealth of its own to attract European capital without recourse to cedulas, by which a large proportion of profits always falls into the hands of middlemen. And I am satisfied that the prudence of the course which Paraguay has followed, in only gradually realising its land, entitles it to a loan which would keep it out of the clutches of speculative jobbers.

CHAPTER IV.

POPULATION.

General statistics—Movement of the population since the beginning of the century—Erroneous returns—Difficulties of investigation—Density of population.

THE estimates that have been made as to the aggregate population of Paraguay are of the most conflicting character. Scarcely any writers agree in their statements, and amongst the numerous returns that have been put forth, not a few have been wilfully or carelessly misleading, whilst others are in flagrant violation of every law which governs such statistics everywhere. If a summary recently published in a local review* could be accepted, it would be certain that Paraguay must have experienced some strange convulsions of the ordinary conditions of human reproduction,—entire families being obliterated by sterility, and others being multiplied with the fecundity of a rabbit-warren.

Incredulous of such freaks of nature, I resolved to make for myself the best investigation I could, and I will now submit the conclusions at which I was enabled to arrive.

The earliest estimate, which can be regarded as in any degree trustworthy, dates from the close of the last century. It is given by Azara,† who says that an official census fixed the total population of the province at 97,480, and this is corroborated by Aguime,‡ who reckoned the inhabitants in round numbers at 96,000.

In 1828, according to Bally, the number of inhabitants had increased to 250,000. This is consistent with the normal rate of increase in South America, which is 2·4 per cent. annually, being by no means exceptionally high, and corresponding with what has been proved to hold good for some parts of Europe :

* *Revue du Paraguay*, 1888, No. 7, p. 28.

† Azara, *Voyages*, vol. ii., p. 328.

‡ Aguime, *M.S. Memorandum*, Dec. 24, 1788.

as for Ireland and (according to Professor Ran) for Hungary. In the hot regions of South America, where families of 10 or even 12 children are quite frequent, this estimate would certainly be below the true mark: it is a rate at which the population would double itself in 29 years 5 months,—a period slightly longer than that of 28 years 7 months, in which the population of Ireland was doubled. Taking, then, into consideration the peculiar conditions of race, the climate, and habits of life in Paraguay, I am persuaded that this estimate of a yearly augmentation by 2·4 per cent. is too low.

At any rate, when we turn to other and neighbouring nations, we find ourselves in face of the following facts:—In the United States, between 1780 and 1820 (which is nearly identical with the period in question), the average increase was 3·99 per cent., the condition of life being in many respects similar—facilities of getting a livelihood, freedom from anxiety, and non-existence of a law of promogeniture, all contributed to promote prolificness. In the United States there ensued a gradual modification of the influencing circumstances, but in Paraguay, under the government of Francia, there was a long period of tranquillity, in which the people lived free from all anxieties, performing a minimum of physical labour, and enjoying a constant round of recreation, a mode of existence that would encourage the tendency to a rapid productiveness.

This impression is supported by the fact that the neighbouring Argentine province of Corrientes, similar in climate and extent of population to Paraguay, exhibited an increase of 3·3 per cent.* for the corresponding period, which is just upon 1 per cent. beyond the 2·4 of the census above referred to. Altogether it seems to me quite reasonable to conclude that the actual rate of increase was at least 3 per cent. annually.

The statistics compiled by M. Jacquet for Paraguay, in 1889, cannot be allowed to controvert this opinion, inasmuch as they are manifestly as inaccurate as any that have preceded them. For the entire country, the excess of births over deaths, in 1887, is set down as 4,602, and this compared with the aggre-

* Napp, *La République Argentine à l'Exposition de Philadelphie*. Buenos Ayres, 1876.

gate population of 263,751, would represent an advance of only 1.74 per cent., which does not only stand at variance with the increase in adjacent countries, but is irreconcilable with conclusions drawn elsewhere by M. Jacquet himself about the progress of the population from the end of last century up to the present time.*

Reasons may be alleged why this figure must be inadmissible. All census returns (as, indeed, all returns of births and deaths) in a country like Paraguay are obtained with difficulty. The scattered state of the population, the lack of means of intercommunication, and the remoteness of the labour-centres in the yerbales, are all obstacles, and these are aggravated by the incompetency and inexperience of those who are employed to make the estimate. A single example may illustrate this: in 1887 the civil registers at Asuncion recorded 390 births, the church registers for the same year attesting 1,155 baptisms, the difference being obviously due to official impotence. And if such fragrant errors occurred in towns, they would be certain to be still more frequent in the country places, where the facilities for baptismal registration were more limited,—children, in the absence of a priest, being constantly baptized by their sponsors, and no thought given to registration at all. Under such circumstances no correct estimate was possible. All praise is due to M. Jacquet for the diligence with which he has applied himself to the inquiry, but he has had no chance of arriving at a trustworthy conclusion, and his work, unfortunately, has only a tendency to mislead.

According to the Census Returns for 1886, the total population of Paraguay would be 239,774; but this was undoubtedly so far short of the true number of inhabitants, that M. Jacquet added 10 per cent. to it, and computed the total to be 263,751. Once again the estimate turned out to be so deficient that, in his year-book for 1887, M. Jacquet was fain to enlarge his estimate by the surprising addition of a further 37 per cent., thus bringing up the actual total to 329,645 souls, or nearly half as much again as the result which had been furnished

* *Anuario Estadístico del Paraguay*. 1886.

by the enumerators of the year before. On the whole, however, this mode of computation is so arbitrary and irregular that accuracy cannot be expected, and in the absence of trustworthy data I think we may fall back upon 3 per cent. as the probable rate of yearly increase in the population. It is an estimate that has at least the merit of coinciding with what physiological considerations would warrant, and of being in agreement with the statistical returns issued in neighbouring countries.

Subsequently to 1828, all through the iron sway of Francia, no contribution was made to statistical knowledge; the country was held under a stern despotism, and the few travellers who succeeded in finding their way in were not so fortunate as to find their way out. With reference to the matter in question, the period is an utter blank.

It is quite different for the years that followed. Between 1848 and 1857 there is a flood of estimates, but each is found to be altogether contradictory to the others. One fixed the population at 1,100,000*; another sets it down at 700,000†; the French consul, Comte de Brossard, informs his government that it does not exceed 600,000;‡ while at the Exhibition of 1855 we find the Consul-General of Paraguay saying that it is more than 1,200,000; and Col. Du Graty, in giving a summary of the official census of 1857, specifies the total as reaching 1,337,489.§

Careful investigations that have independently been made by Dr. Demersay|| would go to prove that there is certainly a great exaggeration in this larger number. He insists upon it that 600,000 is too high a calculation for 1857, and in this he has been followed by the editor of the *Almanach de Gotha*,

* Benj. Poucel, *La France et l'Amerique du Sud*. Paris, 1849, p. 37.

† *La Paraguay, son présent, son avenir*. Rio de Janeiro. 1848.

‡ Brossard, *Considerations sur les Republique de la Plata*. Paris, 1850. p. 12.

§ Du Graty, *La Republique du Paraguay*. (Edit. C. Maquart). Brussels, 1862.

|| Demersay, *Historie du Paraguay*. Paris.

who, after having for several years set down the population at 1,200,000, in recent issues has reduced it by one-half.

Assuming Bally's estimate of 250,000 inhabitants in 1828 to be correct, and taking 3 per cent. as the average ratio of yearly increase, we arrive at 589,000 as the total that would be attained in 1859, a computation that accords with the most trustworthy investigations that were actually made, and which corrects the fictitious returns that were published under the government of Lopez.

At the same rate of progress, by 1866, the year of the commencement of the war of the Triple Alliance, Paraguay would have had a population of about 769,000, and, so far as I have been able to obtain the opinion of competent judges, this would be correct ; so that, including the army of Lopez, the strength of which would of course be known, the aggregate would not exceed 800,000. It is an estimate that agrees very closely with that which was made by Admiral Mouchez after his visit in 1869.*

So far, then, as 1869, the rate of increase which we are assuming yields results that answer very closely to the facts as far as they can be ascertained ; but from that time onward the computation gets more involved in difficulty. The great war devastated the whole land ; hunger and sickness carried off more than the slaughter in the battle-fields ; and although authenticated data are not to be had, it is the strong conviction of those in the best position to form an opinion that no less than three-fourths of the inhabitants disappeared. These considerations, as also the evidence of witnesses, lead us to conclude that the population had been so reduced that in 1872 it barely exceeded 250,000 in all. As there would appear no reason why this estimate should be mistrusted, we may be allowed to adopt it as the basis from which to start afresh on our endeavour to arrive at the existing state of things.

A population of 250,000 in 1872, if increasing at an annual rate of 3 per cent., would become a population of nearly 350,000 in 1886. Official statistics represent the aggregate of the population at that date as only 263,751 ; but it is a figure

* Mouchez, *Carte de la Republique du Paraguay*. Paris.

which would correspond only to an increase of under 1 per cent. per annum, which I maintain is inconceivably low, and even when enlarged by the strange increment of 37 per cent. arbitrarily made (as I have mentioned already), in 1887, remains untenable.

No doubt it might be contended that, after the havoc of the war, the conditions of life were so depressed that the assumed ratio of an annual increase of 3 per cent. was too high, and I have heard it argued that with a diminished population there would be a diminished proportion of births. This might indeed be expected if the number of women were reduced below that of the men ; but as it was the men who were cut off by the scourge of war, and the number of women that survived was not disproportionately small, there was no reason why the *ratio* of increase should be affected. To me it seems more than probable that the 3 per cent. is too low an estimate, yet even this would result in a total of upwards of 370,000 by the end of 1888 ; and if the operation of census-taking could be effectually carried out, I entertain little doubt that it would testify to the existence of a population not much short of half-a-million souls.

Nor must it be forgotten that recently emigration has brought in a certain influx of new-comers, who have to be included in the reckoning ; but hitherto their numbers have not been sufficiently large to make any very material difference : as a matter of fact, so far as the reports of the Emigration Bureau convey any information, the number of emigrants would hardly amount to 1000 a year. Nevertheless there is a considerable foreign element in the population. It was computed by the enumerators of 1872 to be represented by 31,296 residents, who were included in the general census, and thus do not disturb the main conclusion at which we arrive. In 1886 the Statistical Year-Book set down the number of foreigners at 7806, but this is notoriously far short of the truth. The fact is, this figure represents little more than those foreigners whose names were to be found in the Consular Registers.

It is well known that only a small proportion of the foreigners resident in Paraguay take the trouble to get their

names entered in these registers ; and hence the Bureau of Statistics felt justified in estimating the foreign element of the population in 1887 at 12,000 souls.*

With respect to the city of Asuncion itself, it has been estimated that the population in 1886 was 24,838, and that in 1887 it had risen to 34,072 ; and there is no reason to doubt the accuracy of this, since the census in the city was taken without any difficulty. In 1857, according to Du Graty, Asuncion could boast of 48,000 inhabitants ; the Statistical Year-Book, however, sets down the number as only 12,000.

Although I have thus criticised the various census returns, and cannot accept the figures, as to totals, which they present, I am quite ready to acknowledge that in many details they offer some valuable information. Of this character, it seems to me, are the statements as to the proportionate numbers of the two sexes. After the war the most astounding stories found their way into circulation, and even now there are people in Buenos Aires who would gravely assert that there are 32 women to one man ; so that, it is averred, travellers have set out purposely to verify the assertion for themselves.

It is time that such delusions were dismissed. It is certain that when hostilities ceased, vast numbers of names were missing from the roll-call, and possibly the women would be in a majority of 25 per cent. ; but such a relation would have long since been modified, and the census of 1886 exhibited the excess of women over men as reduced to 16·37 per cent. Reference to the baptismal registers of Asuncion, for the year 1887, shows that the percentage was 47·6 for boys, and 52·4 for girls, leaving a difference of only 4·8 per cent. preponderance on the estimate of the girls. In the rural districts it appears that the disproportion is larger, and that the entries for girls are 9·28 per cent. above those for boys. These returns are curious and confirm the observations of Azara, who searched

* *Revue du Paraguay*, 1st year, vii. 26. According to the census of March 1st, 1886, there were 329,645 inhabitants—155,425 males and 174,220 females, besides 60,000 semi-civilised and 70,000 savage Indians. Among the foreigners there were 5,000 Argentines, 1,028 Italians, 600 Brazilians, 812 Germans, 389 French, 195 Swiss, and 168 English. But compare pages 105, 106.

the parish registers at the end of last century. They further coincide with the conclusions at which Col. Du Graty arrived during his stay in the country.*

The disproportion is anomalous : it stands out in contrast with the returns of the Argentine Republic, which shew the births of more boys than girls. In the provinces of Corrientes and Entre Rios, the registers, between 1871 and 1873, go to prove that the boys' births were 9 and 1·18 per cent. respectively above the number of the girls' births, so that it seems as if Paraguay had the monopoly of producing a majority of women. I merely note the circumstance without speculating on its cause.

There is nothing abnormal in the rate of mortality, except, perhaps, that it is rather high for infants in Asuncion, where, against 424 deaths of adults in 1887, stands a record of 384 deaths of the very young. The ordinary death-rate there is low, being estimated at 23·7 per mille, which may be taken as an indication of the general salubrity of the climate.

If the official estimate of the area of Paraguay, as about 90,000 square miles, were correct, the density of the population would be 5·5 to a square mile ; but a calculation made thus would not convey a true idea of the fact. The area thus reckoned would represent the entire territory of the Republic, and be inclusive of the Chaco, or Western Paraguay, which, for the most part, is occupied only by Indians, and should hardly come into the computation, more especially as the frontier towards Bolivia is not defined. By assuming the total area of Paraguay proper to be approximately 62,000 square miles, the density of the population must be reckoned at nearly 8·1 per square mile.

I purposely omit entering into any particulars concerning the Indian population, because so little is really known about them. The Year-Book of 1886 (p. 41) counts them as 100,000. Most of these Indians live in the Chaco, but a few tribes inhabit Eastern Paraguay proper. These latter are comparatively "civilised," their manners are gentle, and they generally work with the gatherers of maté.

* Du Graty, *La République du Paraguay*, p. 265.

CHAPTER V.

IMMIGRATION.

Spread of emigration—Invasion of America by emigrants—Emigration a remedy for social crises in Europe—French commercial transactions at Buenos Aires—Importation of capital—Capital in Paraguay must precede immigration—Private Colonies and Colonies supported by the State—Market gardening—Farming on a large scale.

EMIGRATION questions everywhere have now come to the front. The stream of departures from Europe is perpetual, and the new world maintains the endeavour to attract the overflow of the old.

By what might seem a primeval law of nature, man is always prompted towards bettering his condition, and is unconsciously acted on by an impulse to leave his native soil to seek afar for happier means of existence. An innate tendency to wander disposes him to turn to new lands.

In times of old the migratory movements were carried out by entire tribes. In large bodies these migrants swept onwards with the fury of a torrent, levelling every obstacle that blocked their progress. The day of such brute force is over ; men now act in their individual capacity, and look to their own efforts and the means afforded by science for their advancement in life. But, for all this, their migratory instincts have not yet died out, and, like their ancestors, they follow that high-road of nations which leads towards the west. In the past, hordes of barbarians took Europe by violence ; in the present, civilized communities are establishing themselves all over America ; and, in the future, who shall say whether their posterity will not return to the cradle of humanity, and terminate their wanderings in the heart of Asia ?

It is a movement that no power can arrest. The increase of population, and the imperative necessity of finding means of existence for the ever-growing number of human beings, are

forces which compel migration from overcrowded Europe into other parts of the world, which offer wider opportunities of development.

For a time, indeed, after the great migrations of the early centuries, it looked as if mankind had settled down for all time, and had become rooted for ever in the soil of Europe, and on the borders of the Western Ocean. But it only needed a fresh impulse, such as was given by the discovery of a new world by Columbus, the achievements of the missionaries, and the discoveries of the great navigators of the eighteenth century, to arouse once more the spirit of migration.

At first the adventurers went forth—as in the earliest age—with their swords in their hands, and they destroyed the natives who resisted their invasion. Then came more peaceful times. To the soldier succeeded men of social position and intelligence, as also enterprising merchants.

At the present day the turn of the masses has come to take possession of new lands and territories. The United States have already been occupied, and the time has arrived for the peopling of South America.

Only slowly at first did emigrants arrive in the Argentine Republic; but of late years their numbers have rapidly increased. Between 1871 and 1882 the annual average was 46,600; between 1883 and 1890 it rose to 136,000. In the year 1889 the number of emigrants was 289,014; in 1890, 138,407. Altogether, between the years 1871 and 1890 the excess of immigration over emigration amounted to 1,113,789 souls.

In Brazil, again, the number which until 1886 had only once exceeded 30,000, advanced to 55,000 in 1887, and reached 107,100 in 1890. The total, between 1871 and 1890, has been 587,520.

Still the stream continues to swell. Transport for the emigrant population grows inadequate to the need of it; and when it is borne in mind that over 500,000 people land every year in the United States, that Mexico is being peopled, that Chile is anxious to attract emigrants, while new towns are almost daily springing up in the wilds of Australia, it cannot sur-

prise us to be told that nearly a million souls a year are being carried away from Europe by these currents of migration, the like of which the ancient world never witnessed.

It can hardly be doubted that this emigration is one of the most efficient remedies to the social ills of Europe. It is, therefore, in the interest of the European governments to encourage it, more especially as it largely helps in affording an outlet to the products of European industry.

The time of state-founded colonies is gone and past. Nevertheless, governments would do well to direct these currents of emigrants into suitable channels, so that the mother country may receive some compensation for the loss of a portion of its sons. This is well understood in Germany, whose commercial representatives are at the same time most efficient emigration agents, who study the resources and capabilities of the countries in which they take up their residence, with a view to attracting towards them their poorer countrymen, should the prospects for actual colonisation be promising. German commerce, backed up in this manner by German colonies, is gradually taking the lead. We see this throughout Chile, no less than in the Argentina and in Southern Brazil, where German commerce is growing apace with German colonisation.

In Paraguay signs of a similar advance are not wanting. German firms are growing more and more numerous, whilst two large German colonies have been founded, namely, Nueva Germania and Leipzig.

If France still holds her own at Buenos Aires, this is solely due to the presence of forty thousand French residents in that town.*

If Paraguay has been left somewhat isolated in this large

* Trade of the Argentina and Uruguay with foreign parts :—

	1889.		1890.
Total Imports and Exports ...	201,506,000 pesos.	...	237,922,500 pesos.
To or from England ...	49,951,000	"	81,934,330 "
" " France ...	47,498,000	"	57,779,600 "
" " Germany ...	18,864,000	"	27,696,800 "
" " Belgium ...	26,781,000	"	27,626,100 "
" " Italy ...	7,657,000	"	14,845,100 "
			Tr.

tide of human movement, the reason is not hard to find. Almost forgotten after the war, because deficient of the financial resources by which she could make it known what advantage she had to offer, she could attract none but private speculators to take the initiative ; but the policy that these pursued could not fail to draw others after them, who will be followed by their families and friends. So far, the foreign population of Paraguay has been derived solely in this way.

The registers of the immigration office shew that about a thousand persons come from other lands to reside in the country in the course of a year ;* of these, the largest proportion have been Italians, next to them must be reckoned the Germans, followed in decreasing order by Frenchmen, Spaniards, Swiss, and English. This is taking no account of such as come from Argentina, Uruguay, or Brazil, as, although their number is considerable, they do not rank as emigrants in the way we are now considering.

There is every reason to suppose that larger numbers might have been drawn to Paraguay if the Government had engaged the services of those advertising agents who unscrupulously mislead many who are resolved to emigrate, or had entered into competition with other States by magnifying its own advantages. These agents, where their interests are not concerned, are ever ready to disparage, and they have been instrumental in circulating the wildest reports about Paraguay. Marvellous are the stories that have been told of the heat, the mosquitoes, the tigers, the venomous spiders, the deadly serpents, and the fatal fevers, and, doubtless, they have had their weight in bringing the country into disrepute. In many quarters they are all believed ; and, in my own case, when I was leaving Buenos Aires for Asuncion, my friends seriously warned me of the peril I was incurring, avowing that never a day passed but that a tiger seized a man in the very streets, and that snakes were so abundant that their rattles were a recognised item of commerce. Such impressions were widespread. A short time before I came, five young Frenchmen,

* Immigrants, 1886, 100 ; 1887, 563 ; 1888, 1064 ; 1889, 1914.—Tr.

armed to the teeth, presented themselves at Asuncion and offered to free the city from the jaguars, by which, as they understood, it was overrun. A cordial welcome was given them, but they soon laid aside their rifles and engaged in civil pursuits, which they still carry on.

Evil reports have been industriously spread about the climate of Brazil ; but the calumny is dying out, and the true facts are being more and more known, a good omen that as the truth is realised. Paraguay, also, will not long be exposed to the same unmerited slur on its reputation.

A statement, which I give in an appendix, has been issued at Asuncion setting out the advantages which Paraguay has to offer to immigrants. It shows how strangers are received and their interests considered, and may well be commended to the attention of all governments that are perplexed by the problem of how to deal with the teeming labouring classes.

Money, likewise, as well as population, seems to be flowing in. After protracted and unreasonable hesitation, the money market has recognised how a large opening is offered throughout America. While Europe sends a million of its people abroad every twelvemonths, it becomes aware of the sound policy of letting capital go with them ; the exigencies of trade require to be met, and business transactions between the two continents must necessarily increase. " Up to the present, all important public works are in the hands of Europeans. The Argentine Republic has absorbed a large amount of borrowed money, and yet its loans have continued to be supported on every bourse ; its railway bonds, in 1881, being even quoted at a premium. (They are now at a heavy discount.—*TR.*)

I have already alluded to the Paraguayan loans, by which capital is being acquired for the country ; this, for the last two years, has been effected through the medium of the Exchange at Buenos Aires by large transactions in land, aided by the formation of joint-stock companies. An important syndicate has also been recently formed at Monte Video, with a capital of £1,000,000, which it is proposed to expend in Paraguay, its first operation being the minting of a large amount of gold and silver coins, for which it has received authority from the

Chambers. This tendency of Argentine and Uruguayan capital to drift towards Paraguay is significant, as indicating confidence on the part of the La Plata Exchanges, where there is always plenty of business of their own, where silver is ever at its dearest, and where there would be no thought of extending their negotiations except it were obvious that profit could be realised. This is well worth the attention of European capitalists, whose money it is that is thus being utilised, while the bulk of the profits that accrue is falling into the hands of middlemen.

Why should not this business be conducted with the country direct? Why should there be these intermediate agencies? In all South America no other country has given greater proof of its vitality, its industry, and its political discernment. The unexcitable temperament of its population has kept it undisturbed by revolutionary action, such as has agitated the surrounding republics, and from which some of them, like Bolivia, are still suffering. There can be no adequate reason why Paraguay should remain under the ban of exclusion, by which monopolists have kept her, on the outside of the large financial circles of the world. But a brighter time is at hand, and already her concerns are attracting sympathy and co-operation; successful negotiations have been carried out in Paris by the "Société Paraguay-Argentine"; in London the shares of the Paraguayan Central Railway were taken up with a readiness that surpassed all expectation; some well-supported French companies meanwhile undertaking the project of completing the section of the Transcontinental line between Asuncion and Santos. A new era would seem to be dawning.

In my opinion it would be a great advantage if capital could be introduced into Paraguay before the advent of the great stream of immigrants. It is a country that repays liberal cultivation, and the preliminary operations on lands that have yet to be cleared, cannot but require the expenditure of a considerable amount of money. On poor land, such as abounds in the Argentine Republic, the returns might not be adequate to the outlay, but on soil fertile as that of Brazil and Paraguay, the original expense is very quickly covered. For the present, I reserve further remarks on this matter.

Nothing is more advisable than the establishment of private "colonies" or settlements. This is to be accomplished in two ways, either by application to the Government for a concession of land, which is granted under certain stipulations, or by making an absolute purchase. It is the former of these that has been adopted by the two German societies already referred to. According to the regulations that had been sanctioned by the State, Dr. Forster and the Leipzig Company were granted 12 square leagues of land, on condition that 140 families should be settled upon them within two years, each family to be entitled to 50 "cuadras" (about 117 acres) of the concession.

When this has been duly accomplished, the title-deeds of the conceded territory are made over to the occupiers. On the other hand, if the covenants have failed in being fulfilled, the land, by law, was to have reverted to the State; but should the time elapse without the contract being literally carried out, the State is always lenient, and, taking account of what has actually been done, will be ready to allow a reasonable period of delay. Nevertheless, while owning that certain advantages may arise from thus becoming proprietors, without purchase, of 12 leagues of land, I should advise any company with sufficient means at command, not to adopt this way of proceeding, but to effect a completed transfer to themselves of the land they want. The cost of the fee-simple of the land, as has been stated, is so insignificant in comparison with what the land will yield, that the purchase-money would be an item in the balance-sheet that might be regarded as of no material import. A few months labour will improve the value of the soil a hundred-fold, and the first crop from every acre, which has cost at most only a few shillings, will realize an average of £8. Thus a small preliminary outlay secures immediate possession, without the necessity of waiting; the credit of the purchasers will be so established, that they can mortgage property that is their own, or effect exchanges for other land, and altogether carry on operations to an advanced condition which, under the other plan, at the end of two years would probably be only at its commencement. No restrictions are imposed

by the State; there is freedom of choice as to what settlers shall be allowed to come, without the temptation to accept desirable or undesirable alike, in order that the covenants of occupation shall be fulfilled; and, more than all, there is this to be urged in its favour, that it allows land to be selected where it is most suitable, either with respect to the means of communication which it enjoys or the quality of the soil itself.

The concession system may suit those well enough who have only limited resources, and who regard the acquisition of the land as a speculation; but for a company with capital at command, the comparison, I maintain, is entirely in favour of the system of purchase.

In an enterprise of this character, one of the great securities for success is to have at the head of the settlement a manager who is fully empowered and competent to carry out whatever measures are requisite for the development of the scheme. It not unfrequently has been the case that managers residing at a distance are not only unable to appreciate the details of the requirements, but have been absolute hindrances in the way of their execution. So it was with the Leipzig Company. The home committee in Germany, insisting on having the control of matters without the slightest practical acquaintance with Paraguay, and in opposition to the advice of their resident agent, committed mistake after mistake, until the entire undertaking has been seriously compromised. On the other hand, Dr. Forster, the founder of Nueva Germania, on the Aguara-y-Guazu, has succeeded in a single year in placing the colony under his supervision upon an excellent footing, the mainspring of his success consisting in his having a free hand and being responsible to no body of directors.

It has, however, to be recollected that, although colonizing associations are eminently serviceable as introducing capital (and, indeed, in large measure meet the idea of what colonization means), they are not of themselves sufficient to supply what is urgently wanted. It is imperative that the support of the European money-markets should be obtained, and that they should provide funds for the establishment of banks

and for the construction of public works. The two banks, the National and the Commercial, which have been opened in Asuncion, have been in their way useful, but their transactions are carried out on a very limited scale, and with extreme caution, so that trade remains crippled and unsupplied with proper means of extension. The rate of interest is $2\frac{1}{2}$ or 3 per cent. *per month* for signatures of first-rate credit, ordinary borrowers being obliged to pay 4 per cent. and upwards. Yet, high as is this rate of accommodation, commerce is not retrograde; a proof that the opening of banks on a more liberal basis would give it fresh impetus. The trade of Asuncion in its times of pressure is obliged to have recourse to the exchange of Buenos Aires, where it has ample credit, but at the cost of its independence and of a considerable share of its profits. Only let the markets of Brussels, Paris, and London recognise the existence and capabilities of Paraguay, and this condition of things will forthwith come to an end.

Great public works, especially railways, will be prime factors in the development of Paraguay. These have been hitherto made only to the limited extent that home resources could meet, and it was with considerable boldness that the State engaged to bear the expenses of the extension of the line from Paraguari to Villa Rica; the contract was concluded with M. Patri, a native capitalist, and the work completed without outside contributions. The materials for the work, however, had to be purchased through agents at Buenos Aires (as Paraguay had no established European credit), and Mr. Tornquist ordered them from Krupp, whilst the rolling-stock was obtained from Deutz. It is to be hoped that, for the construction of new lines, of which 500 miles are projected, the money may be forthcoming from Europe direct, so that there may be no occasion for the intervention of middlemen. The works ought certainly to be put in hand and completed in advance of any large arrival of agricultural immigrants.

AGRICULTURAL COLONIES.—Two agricultural settlements have been founded by the Government; one in the Chaco, on the banks of the Paraguay, the other in Eastern Paraguay, on the banks of the Ipacaray Lagoon. The former of these,

which is now known as Villa Hayes, was started in the last century. It was originally called Remanzo, a name given to it by its founder, Father Amatio Gonzales y Escobar, a missionary whose name is still venerated in the colony; he had been *curé* of the little town of Emboscada, on the other side of the river, and resolved at his own expense to form a settlement upon the model of the old Jesuit missions. All previous efforts of this kind, whether made by the Jesuit Fathers or by the Government, had failed, owing to the resistance of the Tobas Indians; but Gonzales had the tact by which he propitiated them, and with the co-operation of the Cuguas, a more peaceful tribe, he succeeded not only in establishing a colony, but in maintaining it. After his death, the colony, under the name of Villa Occidental, was kept up under the auspices of the Government until 1855, when Carlos Lopez, who had been elected President, brought over a number of families from the south of France, calling the settlement by the fresh name of Nueva Burdeos. After the war the name was again altered to Villa Hayes, in compliment to the President of the United States, who, as arbitrator between the Argentine Republic and Paraguay on the Chaco question, had given his decision in favour of Paraguay.

The colony is traversed by two rivers: the Confuso, on the south, and the Rio Verde, which bounds it, on the north. According to the Year Book of 1886, it then contained only 41 houses, with a population of 172; but by the end of 1888 there were about 400 inhabitants, all residing round about the church, or upon their own adjacent concessions. Land has been taken into cultivation with a corresponding increase; it is mainly utilized for market-gardening, and in one season there have been gathered little short of a quarter of a million onions, by no means an insignificant item when it is remembered that they sell in Asuncion for about four shillings a hundred.

Cattle-breeding is carried on with encouraging results; the number of horned beasts rose between the years 1886 and 1888 from 767 to 1,500. Sheep-farming is also being tried, and poultry is being reared with fair prospects of success.

Some Swiss colonists have recently commenced experiments with European fruit-trees, and even chestnut trees have been planted.

Some proprietors have commenced the cultivation of land on a somewhat larger scale. M. Van Strate, one of the leading distillers in Asuncion, has planted an extensive area with sugar-canes, and has also erected a factory about 9 miles from the river. Plantations of ground-nuts are likewise being made; this is one of the commonest products of Paraguay, which is its native soil.

The other government settlement is San Bernardino. It was founded in 1881 by Gen. Don Bernardino Caballero, who was President at that date. It has a good situation on the northern shore of the Ipacaray Lagoon, which is an attractive lake, abundant in fish, lying at the foot of the Cordillera Altos. The water of the lagoon separates the colony from the railroad between Asuncion and Villa Rica, but there is a regular steam-boat service that maintains daily communication with the station at Aregua. Already the whole country around it is fairly well occupied, as the situation is so much appreciated that the wealthier inhabitants of Asuncion have bought estates on which they have put up residences for their families.

M. Scherer, the Immigration Commissioner, issued a report in July, 1888, from which it would appear that San Bernardino had over 600 residents, a large proportion of whom were engaged in dairy-farming. Not a few of these are Germans, making cheese and butter, which they sell in the Asuncion market for about 2s. 6d. a pound. There are several of the colonists who are owners of above 100 head of cattle. As at Villa Hayes, considerable attention is given to the cultivation of the sugar-cane, and two mills are constantly at work extracting the juice, which is all consumed in the manufacture of the white rum of the country.

Such are two settlements already existing, which may well serve as patterns for future colonizing associations to follow. In different situations, one on the rich alluvial soil of the Chaco, the other on the ancient rocks of the most populous

part of the country, they each have their distinctive character. A fair example of what can be done by market-gardening, San Bernardino supplies with vegetable produce such adjacent localities as Asuncion, Aregua, Altos, and Paraguari; whilst Villa Hayes, on the main river thoroughfare, with steamers always plying, can send its products right away to all the towns on the Parana as far as Buenos Aires.

Here, no doubt, is a large advantage. The temperature of Paraguay is such that fruits and vegetables may be brought to maturity at a season when they are quite unobtainable in the more southerly latitudes of Monte Video and Buenos Aires; consequently, in the months of winter and of early spring, tomatoes, asparagus, peas, and cauliflowers, command the most remunerative prices. The transit of the garden produce takes three, or at most four, days.

From Asuncion to Humaita the whole of the river bank is most admirably suited for this branch of industry. Oranges are being grown so freely that 50,000,000 were exported during 1889; tomatoes are sent away in baskets holding from one to four arrobas, *i.e.*, from 25 to 100 lbs., and fetch profitable prices at Buenos Aires. The statistical reports state that 5,522 baskets were dispatched in 1886, and 15,110 in 1887, from the port of Asuncion alone, which is far from being the chief district for tomatoes, as they are grown in greater abundance all along the river.

Enough will thus have been said to illustrate the profitable character of the gardening industry that has made such progress in Paraguay.

After the improved means of communication shall have been opened, so that the remoter districts can be supplied with labour, there will be a third kind of colony that it must be desirable to establish. Colonists should be found who, after making wide clearances in the great forests in the east, should plant the virgin soil with crops of the higher order, such as tobacco, cotton, coffee, and indigo. It will be on colonization of this character that the ultimate prosperity of Paraguay must depend, and in this direction every effort should be made.

I can only repeat that success is unlikely to be achieved unless

the arrival of colonists is preceded by the acquisition of capital, and by the construction of railways. Except these conditions can be satisfied, the outlook is by no means encouraging, as may be seen from the failure of more than one Argentine colony. Strong advocate as I am for emigration, and regarding it as the main lever for American advance, I am sure that it should be adopted cautiously, and not wasted on premature experiments. By disregard of such considerations the German settlement at Leipzig has had to contend with its various difficulties; and although Dr. Foster may be congratulated on what he has accomplished at Nueva Germania, he is still far from the end of his task.

Incomparably the greatest obstacle in the way is the extent and density of the forests. No colonist can commence cultivation on a large scale until a clearance has been made; for a time at least he must live upon the minor produce of his holding; and how, while buried in a wood, is he to find a sale even for that? It may be answered that the controllers of the colony will assist him with some advance of capital, and provide him with means of subsistence for a couple of years. But such a beginning is nearly always bad; once habituated to live on external contributions, the chances are very great that he proves a failure as a colonist, when thrown upon his own resources.

The managing board of any colony ought to take these things into their serious consideration. The prosperity of their undertaking is dependent on them. I am convinced that the settlements of the future which will turn out well, will be especially those which are planted along the highways of communication, so that the colonist may with equal readiness dispose of the timber that he has felled, and the produce that he has grown. Thus encouraged from the first, and deriving an immediate return for his labour, he will be free from the depression which can hardly fail to attach to isolation in the remote solitude of the woods.

It should not be overlooked that there might be colonies established in various places where considerable profit could be realized by cattle-breeding. The Paraguayan forests are not

everywhere continuous, but are broken up by *campos*, or natural prairies, where large herds might be pastured.

Such, I submit, are my general views of the future colonization of Paraguay. I fail to see why Paraguay should not become as prosperous as the finest districts of Brazil, to which it is quite equal in temperature and fertility, whilst it enjoys a climate that is far superior.

PART III.—LABOUR.

CHAPTER I.

MEANS OF COMMUNICATION.

Roads—Inland navigation—International navigation—Railway, Asuncion to Villa Encarnacion—Transcontinental railway, Asuncion to Santos—Political independence of Paraguay.

ROADS.—Were Paraguay traversed by good roadways and means of communication, it would long since have been flooded by the tide of immigration. A commencement has been made, but there is a vast territory still to be opened up. Yet, of all the countries of South America, it was the first to make serviceable roads and to construct railways. Under the government of Lopez there were four important highways starting from Asuncion; 1st, the Southern road, following the bank of the river, through Lambare, Ypané, Villetta, Oliva, Villa Franca, Villa del Pilar, and Humaita, meeting the Parana at Paso de la Patria; 2nd, the Mission road, by San Lorenzo, Ita, Carapegua, Quiyindy, Caapucu, Villa Florida, Santa Rosa, and Villa Encarnacion; 3rd, the East road, through Aregua, Itagua, Pirayu, Paraguari, Ibitymi, and Villa Rica; and 4th, the North road, through Trinidad, Limpio, Juncada, and Arroyos y Esteros, whence it proceeds in two branches, one keeping on along the Paraguay through Itacurubi, Rosario, San Pedro, Concepcion, San Salvador, and the Apá settlements; the other, bending towards the east, and passing Catigua, San Estanislao, Caraguatay, and Villa Ygatimi.

These four leading highways, called *caminos reales*, or royal roads, were connected by a net-work of cross-roads, one of the most important of which proceeded in a north-eastward direction from Villa Rica, and, entering the valley of the

Upper Parana, took in Caaguazu and San Joaquin, terminating at San Estanislao. Carlos Lopez, during the later part of his presidency, commissioned Lieut. Patiño to make a new road from Villa Encarnacion, along the Central Parana, all the way to Tacurupucu.

For further details the reader may be referred to the map. It is needless to say that these roads, like the generality of American roads, are not to be compared with the great highways of Europe; the population has been so scattered, the distances to be covered so great, the obstacle of the virgin forests so considerable, that there could be neither utility nor profit in the construction of roads in any way like the macadamised highways of countries of ancient civilization. A tract across the plains to avoid quagmires, a *picada* through the forest, a few embankments in the sunken valleys, and occasional wooden bridges over the water-courses, had to serve at first to meet all the requirements of American road-making.

During the war, all the roadways were considerably broken up by the passage of troops, and in the period of depression that followed, the Government was in no condition to provide new ones; such as they were, the old ones had to suffice. As soon, however, as business began to revive, attention was at once called to the opening of communications as essential for commerce, and Gen. Escobar took the matter in hand, clearing a fine *picada* through the Parana valley from San Joaquin to Tacurupucu, and so opening a way to the magnificent yerbales of the country.

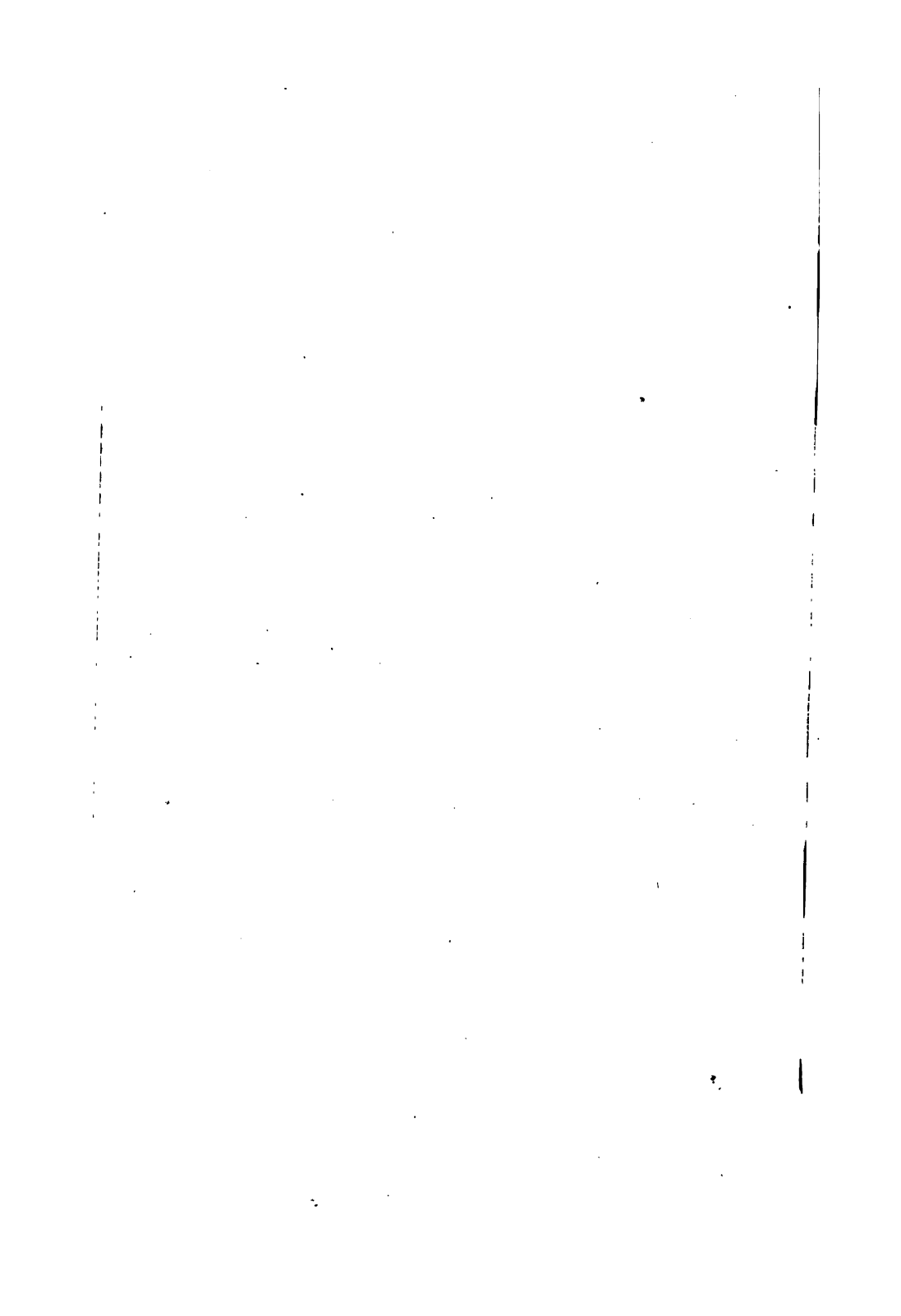
Since this a Board of Works has been formed, and large sums have been voted for the repairs of the roads and the reconstruction of bridges; so that it is hoped that, before long, heavily-laden waggons may proceed in all directions. The engineer in charge of the works is M. Guerbert.

Moreover, the *Yerbateros*, on their own account, have cut a good many *picadas* to their properties, and these, very probably, will become established roads in the future. In this way, already, the *picadas* that run east and west have done much in putting Villa Concepcion in practical communication with all the great yerbales between the Tacurupya forests



E. Plou, Nourrit et C^{re}, Paris.

A PICADA IN THE VIRGIN FOREST



and the Rio Ypané. Similarly, there are roads from Villa Ygatimi, some available for the yerbaes in Brazil, and some for those on the Jejuy river, and on the Sierras Mbaracayú and Vacapara, whence extension to Tacurupucu is easy.

WATERWAYS.—But, after all, nothing has hitherto so much retarded the making of fresh roads as the great facilities of the river-communication. Paraguay, as it has been said, is one of the best watered countries in the world. The basin in which it lies is traversed by a number of important streams, which flow for the most part in a parallel direction, and allow the great river to be in direct connection with the distant eastern cordilleras in which they take their rise.

These streams may be described as natural highways, and may be divided into five distinct groups; 1st, in the north, the tributaries of secondary importance, the Apá, the Aquidaban, and the Ypané; 2nd, those in the basin of the Jejuy; 3rd, those of lesser importance, as the Quarepoty, the Tapiracuay, the Manduvira, and the Piribebuy; 4th, those in the large basin of the Tibicuary; and 5th, on the opposite eastern slope, all the affluents of the Parana.

None of the second or third-rate tributaries are navigable throughout. Some of them, like the Apá and the Aquidaban, are broken by rapids, over which boats cannot pass; others, as the Ypané, resemble torrents, and are navigable only when in flood. At such times, however, they have sufficient depth of water to allow *chatas*, which are good-sized barges, to ascend nearly as high as their source. In this way several of the *yerbaes* of Villa Concepcion are enabled to take advantage of the intermittent navigation of the Ypané, and its left-hand affluent, the Arroyo Guazu. The Manduvira, likewise, renders a corresponding service.

The case is widely different with respect to the Jejuy and the Tibicuary. Both of these must be regarded as rendering efficient services as means of communication.

The Tibicuary, which is both wide and deep, waters a large extent of pasturage, arable lands, and forests. Its two source-streams, the Tibicuary-mi and the Tibicuary-Guazu, run through

a fairly populated country, which to a certain extent was the site of the early Mission settlements, in which various articles of commerce were cultivated. Yerba, however, must be reckoned amongst the items that are of comparatively small account hereabouts, the chief supplies of that valuable production being found only above Yuty, on the Tibicuary-Guazu. A certain number of *chatas* may be seen on the river, but the transport is very largely carried on by *jangadas*, large rafts constructed of the same kind of wood as they convey; these, on arriving at their destination, are broken up and sold in the same way as their freight. Nowhere is the timber trade carried on in Eastern Paraguay with greater vigour than along the banks of the Tibicuary.

A notable difference which the Jejuy presents to the Tibicuary, is that not only is the mainstream navigable, but so also are its tributaries, the Itanarami on the right, and the Capiuary and the Curuguay on the left; even the sub-affluents, like the Corrientes and the Carimbatay, permit the passage of boats.

This network of rivers extends over a degree and a half; the traffic upon it is incessant, arising from some of the finest yerbales being near the sources of the several streams. The *chatas* are ordinarily from 35 to 40 tons burden; they are manned by crews of 6 or 8 men, who push them along by means of bamboo poles about 16 feet long, that have iron prongs at their ends, and are called *botadores*. It is hard work to get the *chatas* along; I scarcely know anything that wants more strength. The men stand up, and, pressing their shoulders simultaneously with all their might against the poles, they walk along the gunwale of the craft, thus forcing it to go ahead. When the current is strong, or some angle has to be turned, their every muscle seems strained to the uttermost; they bend themselves down, and it often looks as if their struggle must be in vain, and it is only when their brute force has prevailed that they pause to shout aloud at their success.

On their way up-stream the *chatas* go nearly empty, carrying merely the few stores that are necessary for the sustenance of the *yerbateros*, whose existence is so remote from the world.

It would, indeed, be impossible to go otherwise ; no crew could convey a large freight. The boats take about twenty days to go from the mouth of the Jejuy to Villa Ygatimi, and those that have to proceed to the *yerbales* either on the Jejuy-Guazu or on the Aguaray, cannot accomplish the distance in less than a month ; the return voyage with a full load, and the current in their favour, is performed in the short space of three or four days.

Hitherto these Paraguayan rivers have seen a very limited application of steam power. Only two screw-boats have ascended the Jejuy. One of these belonged to Gen. Mansilla, the promoter of the fabulous gold-mines of Mbaracayu ; it succeeded once in reaching the rapids of Cambarembé, but it made no second voyage. The mining enterprise had fallen through ; it had proved as perishable as a full-blown rose, lasting only until the gold of the shareholders, as well as all the gold extracted from the sierra, had been drunk away in champagne.

This was in 1879. Since then, a German colonization company has made an experiment with a steam tug-boat, but this little craft only commanded four-horse power, and, to the supreme delight of the *botadores*, was quite unable to stem the current. It was obliged to retreat, and has since been plying at the river mouth, between San Pedro and the Paraguay.

It must not be concluded, from the lack of success that attended these two ventures, that steam-power is unavailable. There would be no practical difficulty in providing tug-boats which could render good service on a river like the Jejuy, which for four-fifths of its course is more than fifty yards wide, and in ordinary seasons has a depth of 16 feet. A towing-chain would meet the difficulty, and the sharp turns in the stream might be very much modified by the removal of a certain number of yards of earth from the angles, an operation which I believe would be forwarded by the action of the river itself, which my observation inclines me to think has a decided tendency to straighten its course.

After all, there need be but little concern about any schemes for river-navigation. The railroads which are being planned

for the development of new life in Paraguay will soon supersede the old natural highways.

As to the rivers of the fifth group, the tributaries of the Central Parana, it has only to be repeated that they are not navigable because their course is broken so constantly by rapids and falls. At the same time, there are certain of them, of which the Acara-y and the Monda-y are examples, which in the upper part of their course do, to a limited extent, allow the water-carriage of yerba, and nearly all the year round keep a number of barges and canoes employed; but all such traffic is entirely local—the great cataracts prohibit approach to the main-stream; and although courageous and energetic boatmen have been known to carry their craft by hand overland past the points of danger, such exceptionable manœuvres only serve to show more plainly the true character of these rivers.

WATER COMMUNICATION with the OUTER WORLD.—All the traffic of the country is at present centred on its two great arteries, the Rio Paraguay carrying on the larger proportion. For years both rivers were completely closed to trade, and although Carlos Lopez, on entering upon his presidency, proclaimed the ports open to the ships of foreigners, the concession was nominal rather than real. A few vessels came in and transacted a certain amount of business in a desultory way, but it was all under arbitrary restrictions on the part of the Government. The principal port of Paraguay was at that time on the Parana, between the two towns Itapua and Candelaria, now known respectively as Villa Encarnacion and Posadas.

Francesco Lopez, with his thoughts ever intent on warlike preparations, was most anxious to form a navy. Accordingly, large dockyards and workshops were created at Asuncion, with the result that in a short time a fleet of steamers was launched upon the river. But only quite recently has there been any real freedom of navigation or any commercial activity.

Several large companies were to carry on the service between Monte Video, Buenos Aires, and Asuncion; amongst them

the chief were the *Argentine Lloyds*, the *Messageries Fluviales*, and the *Platense*, each of which provided some splendid steamships to compete for the traffic of the river.

Europeans, until they have seen for themselves, would scarcely credit the magnificence of the floating palaces of the American rivers. It may be questioned whether anywhere in the world are there vessels as luxurious as those which are found on the La Plata, the Parana, the Uruguay, and the Paraguay. Constructed specially to accommodate passengers, they have stately saloons, elaborately carved and furnished with costly tapestries; they are lighted by electricity, and made gay with the choicest flowers; and they are in every respect equal in their appliances and comfort to the best hotels in Europe. Comparing them with some of the poor little vessels which run between England and various European ports, one is almost tempted to ask where is the centre of civilisation.

The companies above named have since their formation been merged into one, the *Platense*, which is now supreme upon the La Plata, and it is to be hoped that the monopoly thus acquired will not induce them to curtail any of the conveniences and advantages which have been the result of the previous competition. A rumour is afloat that a new company is likely to be formed which will dispute the command of the river-traffic with the company that now directs it all, but it will have no easy task. No country more than America is opposed to monopoly, but as the *Platense Company* are proprietors of as many as 120 steamships, an idea may be formed of the amount of its business, and of the difficulty of any rival company starting to compete with it.

Several minor companies employ vessels of less pretentious character, and are fairly patronised; and, besides the steamers on the Asuncion service, there are some that run the whole length of the river, putting in at the Paraguay stations on their way to the Brazilian province of Matto Grosso. This part of Brazil is very curious, and I hope to publish a separate account of my journey through it. It is in the very heart of the continent, shut in by the densest forests, inhabited only

by a few wild Indian tribes, and especially isolated on account of the intense heat that prevails all through the year, having no channel of communication with other districts except along the Rio Paraguay. Brazil is making considerable sacrifices on account of it, as, although at present it yields barely any returns, it holds out the prospect of bringing in large profits sooner or later. There are gold mines and diamond mines; there are vast forests of caoutchouc; there is likewise a most fertile soil; and these cannot fail, in course of time, to attract population. The Brazilian General Steam Navigation Co. sends a steamer every month up the river to Cuyaba, the passage from Asuncion to Corumba costing 20 paper pesos, and from Corumba to Cuyaba 40,000 reis, which is about equivalent to £4. The company is subsidized by the Brazilian Government, and every voyage involves the enormous expenditure of £2,200. The boats, which are new, well-fitted, and comfortable, of course call at all stations after leaving Asuncion.

A few other vessels, such as the "Guauguay," the "Constancia," and the "Bolivia," are the ventures of private owners, and periodically proceed to Matto Grosso.

The great "*Platense*" Company does not only provide for the passenger traffic between Monte Video, Buenos Aires, and Asuncion, by means of its superb boats like the "Venus," the "Eolo," the "San Marten," or the "Apolo,"—it also maintains a large contingent of vessels which are reserved exclusively for cargo; there is likewise a service of small boats used only on the Paraguay, and these, twice a week, leave Asuncion for Villa Concepcion, stopping at the intermediate ports.

Communication has been opened with the Central Parana by way of Corrientes and Posadas, but it can only be maintained with considerable difficulty, as the rapids have to be passed at Apipe Island. These, which are known as the Salto Chico, make the first obstruction to the navigation of the stream.

Above Posadas the obstacles become much greater, and the passage can only be continued in the small tug-boats owned by the *Platense* Company. These ascend the river as far as Tacurupucu; but beyond this no screw nor paddle-steamer

has been able to proceed. The whirlpools and cataracts might occasionally be defied by individual adventurers, but no regular traffic could possibly be maintained.

The extent of the river navigation is shewn by the record that, in 1890, 2,950 vessels, of 176,692 tons, entered the port of Asuncion, including 381 vessels, of 126,563 tons, from abroad; whilst 2,945 vessels, of 167,159 tons, cleared.

This is a decrease as compared with previous years—in 1886 470 steamers and 3,314 sailing vessels entered; but this decrease is apparent rather than real, as the "*Platense*" had bought out its rival companies. The absence of competition naturally led to a decrease in the number of voyages, notwithstanding that the number of passengers and the freight increased considerably.

Asuncion, where about eight vessels arrive daily, is undoubtedly a port of some importance, and it is not the only port of the Republic. At Villa Concepcion, for instance, about 130 steamers call in the course of the year.

As a result of the absence of competition, all the expenses of carriage are relatively high. The "*Platense*" Company fixes its own tariff, and smaller owners follow the lead. Between Buenos Aires and Asuncion the first-class fare is 50 pesos, with a return fare of 40 pesos, the passage occupying about six days and four days respectively. The charge for freight is 8 pesos a ton. Contrasted with average European tariffs, the rates are extremely high, especially with regard to cargo, which costs just as much from Buenos Aires to Asuncion as it does for the voyage all the way from Europe to South America. However, it is not to be overlooked that here, in America, we are notoriously in the land of competition, and that on any day the charges may tumble down 50 per cent.

When, in 1887, I arrived at Buenos Aires, I was charged, as my fare thence to Monte Video, the very moderate sum of 16 shillings. Only a few months previously the fare had been 8 shillings, including two meals a day, and securing every personal attention. At the time I write the charge has risen to £3 4s., and they hardly take the trouble to give you clean napkins. This will be remedied; wait but a few months, and competition most assuredly will put things right again.

I can adduce a case in point. I knew a Telephone Company which was in the enjoyment of the most complete monopoly that any board of directors could covet. The subscription was 8 dollars a month, which the public paid cheerfully, and the managers slumbered on in a sweet serenity, quite unlike enterprising Americans; but, all of a sudden, a long array of new posts and wires proclaimed that a rival had come upon the scene. Immediately the old board woke up to the situation, and lowered their subscription rate to 50 cents a month, which was of course adopted by the new competitor; and thus the struggle began, giving the public good ground to rejoice that the monopoly was broken down. This spirit of rivalry, so dangerous to my "Lord Monopolist," is now threatening Asuncion, and the result remains to be seen.

A very similar fate would soon befall the Brazilian Navigation Companies if the great European shipping associations would seriously take up the question of South American inland traffic. Some years ago there was a movement on the part of the shipowners of Håvre, who commenced some kind of negotiations with the Government of Paraguay; whether owing, however, to misunderstanding, or to dilatoriness on one side or the other, the business was never concluded. At the time, Paraguay was just entering upon its period of progress, and appeared ready, in order to attract the co-operation of such an important association as the Håvre "Chargeurs-réunis," to make liberal concessions of territory, to give exemption from various dues, and to offer other advantages; but nothing came of the deliberations, and it was upon the failure of the scheme that the "*Platense*" Company made its advance to its present position. Although it has neither obtained the lands nor enjoyed the immunities that were offered to the "Chargeurs," it has carried on a trade which, in the hands of the European Company, would have brought them many millions of dollars.

On the whole, it is much to be desired that the interests of the great maritime associations of Europe should be attracted to the commercial openings that are offering themselves in South America, instead of confining themselves, as many of

them do, to the old lines, where they work with little profit, and allow the world to advance without them.

The "Messageries-Maritimes," in January, 1888, sent over one of their officials to inspect the localities, and to investigate their capabilities. He returned with a report altogether favourable as to the advantages that were offered ; but, once again, no action was taken ; and yet there is hardly anything that should seem to be of much more commercial interest to France than the navigation of the Parana. French goods are sent out ; they are consigned, first of all, to Monte Video, to Buenos Aires, or perhaps as far as Rosario : beyond that there is no responsibility undertaken by the European companies. The packages, once landed, are conveyed to warehouses, where they are examined by officials who exact the heaviest customs dues ; they are next handed over to commission agents, and after being transferred from barge to ship, and from ship once more to barge, they reach their final destination by one of the "*Platense*" cargo-boats. Merchandize exposed to such vicissitudes as these, runs no little risk of being lost, and certainly great risk of being damaged.

An incident in my own experience will furnish an illustration of what I have said. A case of books which was despatched by one of the "M. M." steam-boats from Bordeaux in March, was not delivered to me in Asuncion until October, having been eight months on the way, for which one month should suffice. The bill of lading was duly sent to me at the proper time, and the Company had undertaken to forward the package to Paraguay, but it only arrived after this prolonged delay. So long as difficulties and irregularities like these continue, it is no wonder that merchants prefer to trust to the Buenos Aires houses ; the outlay for freightage may be larger, but there is far greater security for getting their goods more quickly and in better condition.

Both consumer and producer are losers by the existing system. If the producer had direct communication with the ports of the Parana, he could dispose of his merchandize otherwise than by letting it go into the hands of agents, who will make it compete with goods from all the world beside.

The well-made substantial goods that are sent out from France and England can never bear the heavy expense of transport which affects, with comparative insignificance, the flimsy and cheap consignments from Germany and from the United States.

A direct line from Europe to Asuncion, with a subsidiary service of cargo-boats to navigate the river, would overcome all the disadvantages to which attention has been drawn. Such a provision would benefit Asuncion by restoring to it an independent trade, but its great feature would be that it would tend indefinitely to develop English and French industries in the countries of the Rio de la Plata.

Yet steamers despatched from Europe should never be allowed to attempt the ascent of the river above Asuncion; it can never be available for vessels of large draught. The "Brazilian Steam Navigation Co." has had unfortunate experience in the attempt of making the same ship serve for sea and for river alike. If the vessels are built sufficiently large and strong to endure the storms of the ocean, they are altogether too bulky for the variable current of the Parana, and are sure to run aground, and so refuse to answer the helm; if, on the other hand, they are constructed to suit the river, they are equally certain to be too light to be safe at sea. Defects of this character brought about the disaster to the "Rio Apà," which was lost with all hands, in 1887, off the coast of Brazil, and to the "Diamantino," and the "Rapido," which sustained very serious damage in 1889 at the falls on the Upper Paraguay. The three vessels were all owned by the same company.

In times of low-water, the "*Platense*" steam-boats, although they have been built specially for the river, have considerable difficulty in making the ascent; their progress is constantly impeded at such places as Empedrado in the provinces of Corrientes, and at Angostura, below Asuncion. It is true that for the greater part of the year the water is sufficiently high to permit the free passage of the ships without much anxiety or particular attention on the part of the pilots; but when the water is low, or in seasons of drought, accidents must be looked for, and it may become necessary to tranship

the cargo. To me it appears that it would be quite feasible to arrange for the transshipment of merchandise, either at Monte Video or Rosario, from the large ocean-steamers to flat-bottomed boats that would be available in all conditions of the water. Whatever may be the present indifference to the matter, I entertain no doubt but that some such scheme will before long be set on foot, and as it can scarcely fail to be profitable, I trust that France will have a large share in it.

RAILWAYS.—At present, however, it is quite intelligible why the commercial interests of Paraguay are mainly centred on the extension of the railway-system. A population so scattered, over a territory so vast, cannot thrive unless provided with ample means of communication. Neither rivers nor roads are sufficient to meet the necessities of such a progressive region as the La Plata States. The time is passed when the construction of railroads was looked upon as a hazardous enterprise, only to be undertaken in places where civilization is far advanced; the experience of the United States and of the Argentine Republic conclusively demonstrates, that wherever railways have been built, they have brought new life into whatever districts they pass, and have proved a source of profit from the first days of their being opened.

The Government of Paraguay was not long in opening its eyes to the benefits that the country would reap from the construction of railroads, and President Carlos Lopez resolved that a line should be made to connect Asuncion with Villa Rica. The work was commenced in 1859, a date at which few American States had conceived any idea of such an enterprise.

Reaching from Asuncion to Paraguari, the first section of the line, about 45 miles, was made under the direction of Mr. Padison. The plans for the second section were drawn by Messrs. Valpy & Burrel, and the work was on the point of being commenced when the war broke out which desolated the whole country. The completion of the line was thus arrested until 1886, when the Government, having purchased it from the hands of a private company to which it had been sold, gave orders that it should be proceeded with,

and entrusted the undertaking to Don Louis Patri, one of the wealthiest capitalists in Paraguay. Under the supervision of a French engineer, M. Gil Regnault, the work has been commenced, and the line has been completed to Villa Rica, a total distance of 95 miles. M. Regnault has made several improvements on the Valpy-Burrel plans; and now, thanks to his able direction and M. Patri's liberality, Paraguay is able to boast of an excellent railroad.

Justly anxious to do all in its power to assist private effort, the Government resolved to sell the railway, and it has been purchased by an English Company, who are under covenants to continue it all the way to Villa Encarnacion, on the southern border of the Republic. It is to be completed in 1892, and will then be in connection with the Argentine railroad, now building to Posadas, opposite Encarnacion. When complete it will place Paraguay in direct communication with the Argentine provinces of Corrientes and Entre-Rios, and more especially with the port of Monte Video, by way of Concordia, Salto, and Durasnero.

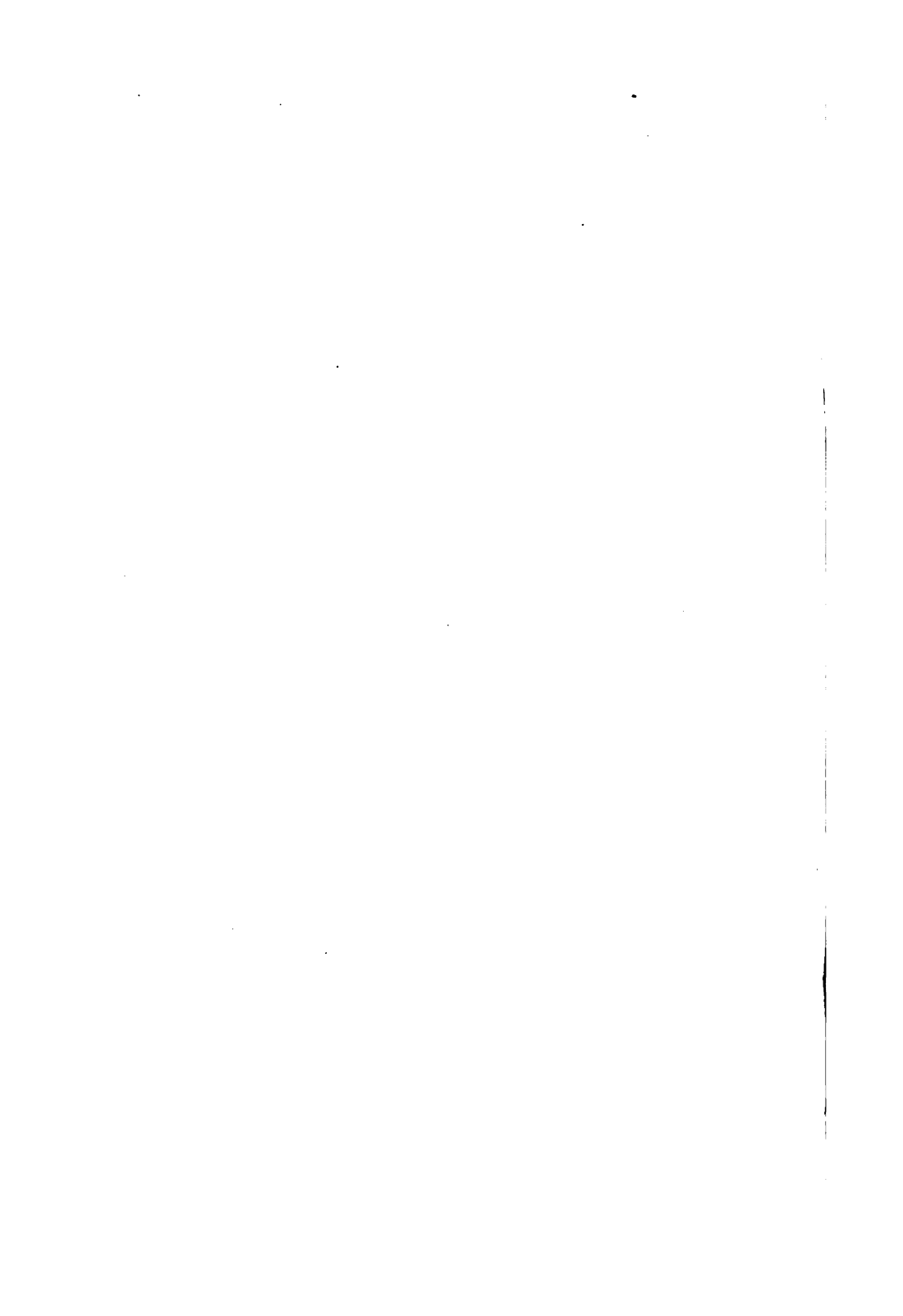
Although, at present, the section of the line so far finished can only be utilized for local traffic between Asuncion and Villa Rica, the use that is already made of it augurs well for the time when the capital that is being laid out upon it brings the whole to a completion. Hitherto it serves a population of about 121,000, who live within about 10 miles on either side. The steady increase of the receipts, from £12,000 in 1881 to £42,000 in 1888,* is noteworthy as illustrating the extension of trade in Paraguay, and yet it fails to represent fully the commercial progress, because the rolling stock has been insufficient to meet the demand upon it. Without capital to add to their locomotive appliances, the directors have been compelled to decline traffic which has been offered them. The service consists of only one train a day, and still results in the bringing in of the revenue of over £40,000 a year.

* The actual return in pesos is, for 1881, 61,207; for 1882, 68,383; for 1883, 71,055; for 1886, 127,319; for 1887, 161,550; and for 1888, 210,000. *Passeu-gers* (1889), 404,777. Quite recently the section from Villa Rica to July (54 miles) has been opened.



E. Plon, Nouvilet C^o, Paris

A RANCHO NEAR VILLA ENCARNACION



So bad and dilapidated had become the condition of the original line, that it was necessary to spend all available funds on repairing it. As many as 60 bridges have been rebuilt, and new rails, on the Vignolles system, are being supplied, so that the old portion, when renovated, will be in no respect inferior to the continuation, which is being constructed on the best and most modern principles.

But no local line of railway will long suffice for Paraguay. A great project has recently been elaborated, the execution of which would immensely contribute to the progress of the republic, bringing it into direct communication with the east coast. Such a scheme is that of the Transcontinental Railway from Asuncion to Santos.

Running from Asuncion to the north-east boundary where the Sierra Mbaracayu joins the Sierra Amambay, this proposed line would cross Brazil somewhere near lat. 24°, and have its terminus at Santos, the chief port of the province of San Paulo. Its length would exceed 800 miles.

The originators of the scheme are M. de Modave of Masogne, Vicomte Obert of Thieusies, and myself, and its details are based on the investigations made by me during my exploration in 1887.

There is no space here to enter so minutely as I could wish into the consideration of the political importance of the scheme, but no doubt it has a very direct bearing upon the relation of Paraguay to the adjacent states. Situated as it is, in the heart of a wilderness, Paraguay, with no other communication with the civilized world except the Parana, has hitherto been necessarily subordinate to the control of the authorities at the river-mouth, and incapable of escaping their interference with its industries and commerce. All the proclamations that have been made about the navigation of the Parana being free and unrestricted, have been mere pretences, and entirely visionary; and so long as no practical measures are taken to make the avowed freedom real, they can only be regarded as a dead letter. No more conclusive evidence of this is needed beyond what has been said already relating to the transshipment of all goods, and the imposition of heavy dues upon them.

It was under the conviction of the futility of all such proclamations that former governors of Paraguay suffered the country to sink into what was practically equivalent to a state of blockade: "We are," they said, "under the surveillance of those who are in possession of our ports. Rather than acquiesce in this, let us isolate ourselves, and thus prove that we suffice unto ourselves." The sentiment sounds dignified enough, but it is based upon a totally wrong conception of the vital interests of a people. Those who propounded it would have done better to seek some other outlet, and thus to counter-balance the unreasonable pretensions of one neighbour by enlisting the pecuniary interests of another. This is how Switzerland acted in Europe.

The policy of isolation was suicidal; submission was little short of extinction; under it Paraguay became virtually a nonentity. In spite of the export of 50,000 tons of produce, its name was unknown on the European markets; the commercial record published at Antwerp, comprising returns of exports and imports of the whole world, in its issue of 1887 does not even mention Paraguay by name. And why? Not because Paraguay had made no contribution to the general stock; but simply because Paraguay was absorbed in the Argentine Republic, which had become the purchaser of all the produce, selling it again at a profit, and taking the transaction to the credit of its own account.

A state of things such as this should be stopped. It is in the interest of all concerned that some way of ingress and egress should be found other than the mouth of the Parana, and altogether independent of the Argentine Republic. Such a way would be provided by the construction of the suggested great Transcontinental Railroad.

By this project, if once carried out, Paraguay, relieved from the dominant control of Buenos Aires, would be brought into direct communication with the European lines of steamships that bring out alike the immigrants and the merchandise; Asuncion would be within a journey of 30 hours from the sea-coast at Santos, instead of being separated by the tedious river-route, which it takes 10 or 11 days to accomplish.

The map shows that this gigantic railway would traverse the very finest districts in the whole country, including vast forests and most productive *yerbales*. It would have to be supplemented by a branch to Tacarupucu.

It has been maintained, though perhaps chiefly by theorists who are practically little acquainted with the economic conditions of the New World, that railways should only be built to develop existing trade, and that their extension should be dependent upon the actual produce of the lands through which they are to pass. The fallacy is self-apparent, when it is certain that, had the theory been acted upon, there would not, up to the present time, be a single railway on the new continent.

In Europe, where land is under all but universal cultivation, and the maximum of production is being attained, and where population has swollen to nearly its full limits, it may be quite proper to proportion the capital that is expended on means of transport to the amount of produce that the locality yields, and a conformity to such a rule may be said to be a *sine quâ non* of success; but in unexplored countries, with their vast tracts of virgin soil, where nature cries out for labour, and where the immigrant finds scope for occupation and recompense for toil at every turn, it is of all necessities the most urgent that the means should be established by which the labourers should be conveyed to the lands that need them. If, in Europe, a railroad may be said to be the product of the producer, in America it is the agent that produces the producer.

No better help in the distribution of emigrants can be conceived of than a railway. All along it, settlements are sure to multiply, industries spring into existence, and the wilderness is converted into productive land. Colonization without railways has ever ended in failure, like the barren attempts that have been tried in the Chaco, and in other districts similarly destitute of the appliances of locomotion; and even railways themselves will lack the main elements of success if they are made to serve mere local requirements.

Marvellous is the rate at which emigration from Europe to

America has continued to increase. In 1886, 490,109 immigrants arrived in the United States; in 1891, the number rose to 560,319. In the Argentine Republic, 93,116 in 1886, rose to 138,407 in 1890. In Brazil the increase was more than four-fold, 25,741 advancing to 107,100. According to the statement of the *El Comercio del Valle* (St. Louis, U.S.), 10,000 European families were brought over by a Mexican Colonization Society. Where can these multitudes find new homes except on uncultivated land, rendered accessible by means of railroads?

A singular incident that occurred a few years ago on one of the recently constructed lines in the south of the United States, appropriately supports this contention. A fresh branch was being opened, when a crowd of workpeople arrived with their goods and chattels. A broad plain, totally uncultivated, stretched between the old line and the new; the people took possession of this; they put up their tents there that night. Within a week the tents had been replaced by wooden huts; and in six months the settlement had grown into a town, with a population of 6,000, and a daily newspaper.

Instances of a similar nature are by no means uncommon in the progress of America, and there is only one solution that explains them all: there was the preliminary provision of a line of railway.

The soundness of the policy does not admit of a question. The United States did not wait until the country around St. Louis had been populated before they built their great Pacific lines; and the projected Asuncion-Santos line would run through a country equally fertile, and would not fail to be equally a success.

And beyond all this, the opening of such a line would have the effect of modifying the political relations of the inland regions of South America. It would bring vitality to other lands, and not only would prove of incalculable service to Paraguay, but would be a benefit to ill-fated Bolivia, which, since the war with Chile, has been in a condition of bondage. At present its only outlet is by way of the Paraguay, and even so it is a 3-months' voyage to Europe; the contemplated

railway would diminish this time by at least one-half. Matto Grosso, too, in the most remote part of Brazil, the Parana lands, now entirely isolated, and Corrientes and Misiones, hitherto lost in the recesses of their forests, and beyond the marshes of the Ibera Lagoon, would all be stirred into new life, while Asuncion itself would become the metropolis and great emporium for the produce of them all.

CHAPTER II.

THE SOIL.

A "rosado"—Varied character of soil—Sandy soil—The red earth of Paraguay—Humus—Burmeister and Napp—Soil of the Argentine Pampas and the Russian Chernozem—Black earth.

EASTERN Paraguay is a country that is eminently adapted for cultivation. The wide plains with their rounded eminences, the meadows on the lowlands, and the wooded hill-sides, even in their natural condition, are all rich in encouraging promises for the agriculturist.

It is accepted as a recognized fact that the abundant vegetation of a virgin-forest covers a soil that is already fit for immediate tillage, and I have assured myself that Paraguay is no exception to the rule. A rough clearance of the wood is the only preparation that is needed to secure an excellent crop of maize or any other cereal. The residents are so aware of this property of their soil that, in order to secure a good harvest, they simply select a convenient piece of the forest-land, cut down the trees to within two feet of the ground, burn all the rank grass, and then scatter their seed broadcast between the stumps of the trees that have been felled. This is called a *rosado*. The crop is sure to be large, and it is quite marvellous to see what a lavish return Nature has made for a minimum of labour.

Underneath the dense entanglement of the forest vegetation, it has been ascertained that there are four distinct varieties of soil, each having its own special properties; they may be classed as sand, red soil, humus, and black soil.

SANDY SOIL.—The sand in its distribution is extremely irregular. It is found both on the higher parts of the plateaux, and along the borders of the valleys, in strata dipping down to the river. There are two sorts of it, the white and the red.

The former is the resultant of the wearing away of the quartz rocks of the great central and eastern sierras; its whiteness is quite dazzling, and it is very fine in grain. Nothing can possibly grow upon it except a few herbs, and it is consequently useless for any agricultural purpose; but in extent it is limited, and is chiefly confined to the region of the Central Parana.

The other sort is dark red, and is the detritus of the vast strata of sandstone that constitutes the main framework of the country. Its colour is due to the peroxidation of the iron in its composition; after rain it frequently exhibits small dark streaks, which are to be accounted for by the presence of magnetic iron. Vegetation thrives upon it, and almost all the soil round Asuncion consists of it. No soil is better suited to the vine, leguminous plants do well in it, and the bromeliaceæ, especially the pine-apple, grow most vigorously. Forage-crops, too, such as lucerne, like this light earth, and yield most luxuriant crops around Asuncion. It is equally well suited to the cultivation of the vine. According to Azara, the vine did exceedingly well around Asuncion at the close of last century, and it only needs energy on the part of the cultivators to work vineyards with the certainty of success.

THE RED SOIL.—Most interesting of all the soils of Paraguay is unquestionably the red earth. Its composition attracted the attention of M. Aimé Bompland, who secured the services of Dr. Demersay to get it analysed at the School of Mines in Paris, where M. Rivot, the engineer, ascertained its component parts:—

	Per cent.
Clay and quartz	65·6
Oxide of iron	18·7
Lime	2·8
Loss (by fire)	11·6
	98·7

In the specimen submitted for analysis there was no phosphoric acid; the clay which it contained yielding readily to the action of the acids employed.*

* Demersay, Vol. II., p. 14.

Although this red earth is found in its greatest abundance in Paraguay, where it is not unfrequently a good many yards in depth, it is by no means uncommon in the provinces of Rio Grande and Corrientes, and still further north in Matto Grosso. In my opinion it has much of the characteristics of *loess*, but of a kind that is somewhat highly charged with vegetable matter. An examination of the deep ravines on the banks of the Paraguay proves it to be perfectly homogeneous, although it presents considerable variety of colour. The lower strata are more yellow, the tendency towards red increasing upwards to the surface, where it becomes oxidised under the influence of the air and rain. It is permeated by a network of tiny threads, apparently the residue of roots which have been coated with crystallizations of carbonate of lime. This capillary construction has been well described by Baron Richthofen, and a favourable spot for observing it is on the road from Asuncion, about one and a half miles from Trinidad.

I have found some fairly preserved specimens of *helix* and *bulimus* in it, and, after heavy rain, these can often be found quite perfect in the ravines that I have just mentioned; and in the lower part of the red strata fragments of bright quartz occasionally occur. The earth is not always absolutely on the surface, but in certain valleys, especially those of Aragua, Itagua and Ita, it underlies a stratum of red clay that is so devoid of calcareous matter as to be admirably suited for brick-making.

This, which I call the red '*loess*' of Paraguay, is not to be confounded with the grey loess on the pampas of the Argentine Republic, which is very meagre in productive power. Here it is singularly prolific, being full of vegetable matter. When crumbled in the fingers it gives a peculiar odour, and in this respect it is very similar to the vegetable earth of Cuba, the composition of the two being nearly identical, as may be seen from the analysis of the Cuban soil made by M. Berthier, who specifies the subjoined proportion of the component elements:—

Clay.....	50 per cent.
Peroxide of iron	14 „
Carbonate of lime.....	8 „
Oxide of manganese.....	1 „
Water and organic matter	25 „
	<hr/>
	98 „

The correspondence is interesting, especially when it is borne in mind that the red earth of Paraguay is peculiarly suited for the growth of tobacco, which acquires a much appreciated perfume on soil of this kind. Both the analyses were made before the discovery of carbonate of lithine, which has been proved to exist in considerable quantity in Cuba and Auvergne, and probably has an influence upon the tobacco-plant. It is worth knowing whether it is to be found also in the red earth of Paraguay.

Nor is tobacco the only product that thrives in this soil, for it is equally favourable for maize, for cotton, or for coffee; and thus it may safely be affirmed that the red earth is pre-eminently the agricultural soil of the country.

HUMUS.—Third, in my classification of the various soils of Paraguay, I have placed what may be described as humus. It lies within the virgin-forests, and a soil of greater natural fertility it would be difficult to find. This humus has been accumulating through unnumbered years in the hot and humid atmosphere of the underwood, and is all the more productive as the roots of the tall forest trees penetrate far into the ground. Now, here we may be said to come face to face with the axiom of Liebig, and of Burmeister too, affirming that "*the cultivation of new soil is only to be carried out by substituting for the existing vegetation one of an inferior order.*"

It is obvious that vegetation more vigorous than that of these great forests primeval does not exist, and that, consequently, cultivated plants which supersede it ought to yield most excellent crops. I need scarcely add that the results have justified these anticipations.

Burmeister's views were fully discussed in the Argentina, whose hopes and interests were materially affected by it. The German *savant* had, in fact, stated that the *Pampas*, whose

natural vegetation was of a poor description, were utterly unsuited to the cultivation of cereals. "Never, he said, can they be profitably cultivated, for their soil, if cultivated, cannot be made to yield anything superior to what it yielded when in a state of nature."

M. Ricardo Napp, in a book of the Argentine Republic, published in 1876, attempted to refute the view of the learned naturalist. He maintained that the barrenness of the Pampas was due to the frequency of violent winds, and that the presence of great forests could not, as a rule, be accepted as a proof of the fertility of the soil. In proof of this he referred to pine-woods and palm-groves, which cover soil of inferior quality.

"The plains of North Germany," he said, "which are so remarkable for their fertility, are nearly destitute of trees. Besides, it is vain to ascribe the fertility of a soil to its composition, as is clearly demonstrated by the agricultural colonies of Santa Fé, Entre-Rios, and Buenos Aires."

M. Napp's argument in all this is very far from conclusive. First of all, he overlooks the fact that these wide plains of Germany were, in the early centuries of our era, covered with dense forests, which gradually, during the middle ages, were cleared away to give place to cultivation. Such has ever been the case throughout Europe, where woodlands, of whatever extent, have always had to disappear before the advances of agriculture.

A second consideration, of which M. Napp fails to take account, is that, if pine-trees and palms are able to grow on poor soils, this is owing to their fasciculated roots, which require comparatively little depth of earth, being nourished by the debris of the surface, and mainly by the atmosphere. High winds would naturally uproot trees that have so slender a hold upon the soil ; but they are never known to have interfered with forests whose trees have deep-seated tap-roots. The most violent winds have no effect upon the great oak-forests of Algeria and Tunis ; and although, in Paraguay and Brazil, storms are not unknown which have uprooted enormous trees that stand apart, they have left the forests unscathed

and thriving as heretofore. To me it seems that an open expanse of country and the absence of trees contribute to intensify the action of wind; and, conversely, I should absolutely deny that the growth or stability of forests would be checked by its violence. In proof of this I may refer to the success with which the Landes have been replanted with trees, notwithstanding the high winds which prevail there.

And if thus I have shewn the fallacy of two of the arguments advanced by M. Napp, I may be allowed to notice another which he appears to consider unanswerable. He asks us to look at the results obtained in the agricultural colonies of "Buenos Aires, Santa Fé, and Entre-Rios," and to note the enormous quantities of cereals that are produced there. It is open to reply, in the first place, that Entre-Rios is not a case in point; the province lies on the left bank of the Parana, and has never been regarded as forming part of the Pampas; it enjoys one of the richest soils in the whole of the Argentine Republic, and belongs to the same category as Corrientes and Paraguay; moreover, as a matter of fact, it is extremely well wooded.

With regard to Santa Fé and Buenos Aires, it must be conceded that first impressions would seem to favour the argument of M. Napp; and the progress that has been made during the 12 years since his book was written, conclusively demonstrates the fertility of the soil. The annual export of corn has become enormous; the increase in value in 1887, as compared with the previous year, was no less than 14,158,000 pesos. Most of it was wheat, and the unprecedented supply, added to the consignments from North America, caused a series of fluctuations in the European markets. These first appearances, however, require to be modified; the statistics, when carefully analysed, are no positive demonstration of the fertility of the land, but are due to circumstances that deprive them of their apparent significance.

Year after year Europe sends out 100,000 emigrants, of which a considerable proportion find their way to the colonies of the Pampas and Santa Fé. Here they find a bare soil which requires no breaking-up, and no preparatory cleansing,

but giving at once, in return for a minimum of labour, a maximum of profit. It follows, then, that the figures of the statistical record do not represent the gradual and growing increase of a fertile soil; they rather attest the great impulse that has been given to production, by the arrival of thousands of fresh labourers, continually putting fresh land under tillage. This is a consideration always to be borne in mind.

Further, in order to arrive at a just estimate of the productiveness of the soil, account must be taken of its average yield. Now, in the part of the Pampás which is most productive, the province of Santa Fé, the yield rarely exceeds 4 or 5 bushels an acre, while France yields from 9 to 16 bushels, and England from 27 to 33 bushels, and even more. What else, therefore, is to be concluded than that in reality the soil of the Pampas is poor? The large aggregate of produce is due not to the richness of the land, but to its extent. Nor should it be overlooked that for a considerable period before it was brought under the plough, it was utilized for cattle-breeding, and consequently has had the benefit of a certain amount of manuring; but as soon as this nourishment shall be exhausted, and the ground has to be subject to the deeper culture which marks the second stage in dealing with richer soils, the agriculturist will find himself brought into contact with the *loess* that so closely underlies the surface, and upon which all his best labour will be bestowed in vain.

It is altogether a delusion for settlers to congratulate themselves that they have only to "scratch" the Pampas to secure a crop; they have yet to learn that, when "scratching" is to be followed by digging, they will come down to a soil which will defy all their efforts to make it productive.

Such are the considerations that compel me to accept the Liebig-Burmeister theory. I can only repeat my conviction that the apparent success of these Pampas colonies, merely proves that statistics may be made use of to support untenable conclusions. The truth remains that, so long as virgin soil is being occupied by batch after batch of fresh immigrants, the total yield of the crops will increase; but no sooner shall all the available soil have been broken up, than deterioration will

ensue, just as has been the case in certain localities of North America, where, after the brightest promise at first, the yield is decreasing year by year.

Again, M. Napp institutes a comparison between the South American Pampas and the Steppes of Russia.* Except in respect of their flatness, the two have nothing whatever in common. The soil of Southern Russia, which is at once so fertile and so light, was for a long period of years densely covered with tall grass; organic decomposition never ceased to be going on beneath the vegetation, which ever sprung up afresh and grew sufficiently high to prevent the escape of any gaseous matter. The resultant is a black soil known as *chernozem*. It is from four to five feet deep, and extends over a vast area of nearly 400,000 square miles in Russia alone, without reckoning the plains of Hungary and Moldavia. The agriculturist may turn over his land again and again without exhausting its richness. M. Napp's comparison is most unfortunate: it only serves, by contrast, to bring into prominence the poverty of the Argentine soil, in which there is scarcely a trace of organic matter, while the *chernozem* contains 17 per cent.

If it were possible to find any soil in America that bears a resemblance to the black soil of Russia, it would be that of the virgin-forests, where, beneath the dark vault of the larger trees, there is a constant accumulation and as constant a decay of the vegetation of the undergrowth. To make such soil productive it is true that a whole year's labour must be bestowed upon it: the land has to be cleared, and thus there is no immediate crop to pay for the cultivation; but the toil will be amply made good, and there will be no risk of the toiler losing the benefit of his outlay. Every day's experience confirms this alike in Brazil and in Paraguay.

BLACK SOIL.—There remains yet to be noticed the fourth kind of Paraguayan soil, that which I have called the "black" soil. This, again, is in no respect like the soil of the Russian

* Napp, *Argentine Republic*, p. 279.

steppes. It is, in fact, an alluvial soil deposited by the floods of the rivers of the Chaco, or in the swampy valleys of Eastern Paraguay, and the bottom of the swamps locally known as *esteros*. It consists of a loam, entirely free from lime, and forms an impermeable subsoil. It possesses all the best qualities for brick-earth, and when baked it has a nice red colour. It contains a fairly great quantity of organic matter, and if exposed to the action of the air by deep ploughing, will yield good crops.

By the application of lime to it, it can be turned into a soil of first-rate quality. It is this soil which crosses nearly the whole of the Chaco, where the herbs growing upon it render possible cattle-breeding on an extensive scale. Experimental plantations of sugar-cane have yielded fair results.

Certain trees grow luxuriantly in this soil, as is proved by the Quebracho Timber Works at the Obrage de Gil on the Pilcomayo, and at Puerto Casado, and the colonies near it, on the Upper Paraguay.

The remarks which I have made enable the reader to form his own opinions as to the character of the arable wilds of Paraguay. They will serve as an introduction to the agricultural questions which will be dealt with in the next chapter.

CHAPTER III.

STOCK-BREEDING.

Organizing an estancia—Profits—Saladeros and tanneries—Horse-breeding—Horse-racing—Domestic animals.

STOCK-BREEDING in Paraguay has not yet attained anything like its proper development. Previously to the war, it is estimated that there were at least 2,000,000 heads of horned cattle in the country, but, in 1886, inquiry was made, and it was ascertained that the number had been reduced to 729,796. In 1890, however, there were again 861,954.* And yet, in spite of the total having been diminished by over one-half, there are clear indications that the soil is really very suitable for cattle-breeding. As a matter of fact, the losses had been so terrible that in 1870 there were hardly 15,000 beasts left in the country; in 1876, they had so far increased that they amounted to 206,000; and since that date the increase has been very large, having amounted, on an average, to 44,000 heads annually. To a considerable extent this increase is due to the importation of foreign cattle.

Compared with the area of the country, the proportion of cattle is nine to the square mile; before the war it was over twenty. At present, in the Argentine Republic, where cattle-farming is extensively carried on, it only amounts to twenty-one.

Careful records kept in the estancias have shown that a square league of land is capable of supporting between 1,500 and 2,000 grown up beasts, which is about 260 a square mile. At that rate Eastern Paraguay alone (61,800 square miles), might support 16 million head of cattle.

The largest fortunes in South America have been realized

* In addition to 99,693 horses, 4,621 mules and asses, 62,920 sheep, 14,656 goats, and 10,778 pigs.

from cattle-breeding, and it is still one of the safest investments for capital. Little risk is involved in this branch of industry, unless, indeed, there should be a visitation of the murrain.

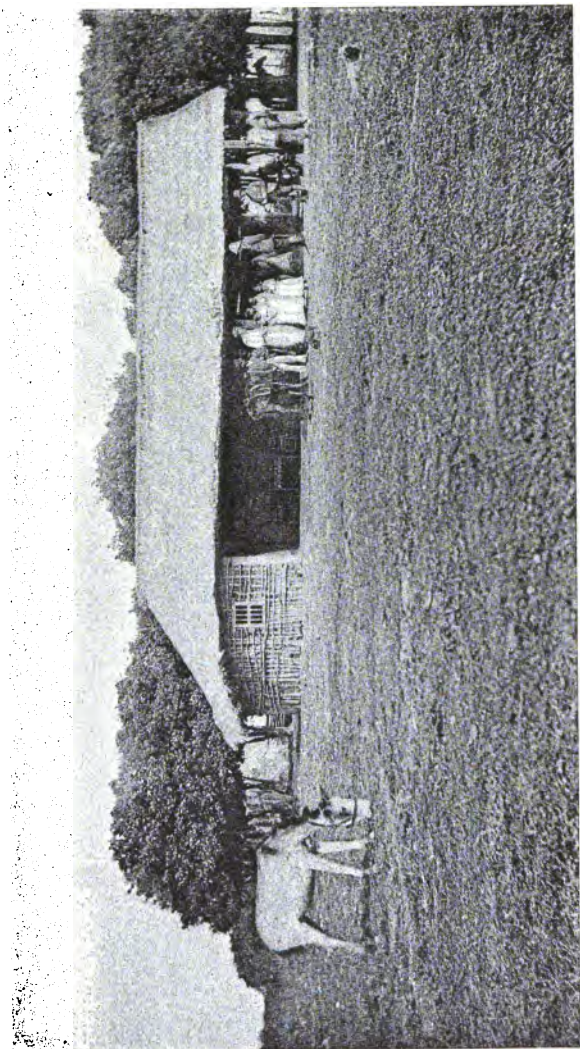
Starting an estancia is quite a simple matter. When the land has been purchased,* it is necessary that it should be enclosed with wire fencing,† and it may then be stocked with beasts in a number proportionate to the area as indicated above. No special knowledge or exceptional care is requisite, as nearly everything is left to Nature, and the herds multiply in the ordinary course. The owner has little need for interference beyond periodically collecting them that they may be counted, seeing the young beasts branded with his own mark, satisfying himself as to their condition, and selecting those which he intends to sell.

The life of an *estanciero* has been so often described that it is quite needless to enter into details about it. In North America and South America alike—in the vast cattle-drives of the Far West, the “lazo” of the Pampas, and the “rodeo” of Paraguay—the occupation is the same, and the *gaucho* of the South is identical with the *cowboy* of the North. It is true that the Southerner has been influenced by the geniality of the climate. Like his northern colleague, he carries his knife and revolver in his belt, but to his saddle-bow is attached a guitar, and in the evening, whilst his meat (*asado*) is roasting at the ranch fire, he tunes his instrument and sings to its accompaniment; but, in the main, the life of both is the same. It has become quite the rule for *estancieros* and for ranchmen to entrust the management of their cattle-runs to an overseer, (or *capataz*), who will be sufficient to look after everything, as soon as the business has been started on a good footing.

Some few conditions there are which are necessary to secure success in ventures of this kind in Paraguay. The land to be purchased should include a *campo*, or pasturage, a *monte*, or wooded hill-tract, and a *bañado*, or marshy bottom-land. These will provide the requisite elements; in the *campo*, the animals

* The price of land has been referred to in Part II., Chapter III.

† A fence or “alambrado” of five wires attached to posts about five feet high costs about 184 pesos a mile (500 to 600 pesos a league).



E. Plou, Xourrit et C^{ie}, Paris.

AN ESTANCIA IN THE MISSIONS

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will ordinarily graze and find pasturage to keep them in good condition ; but in seasons of heavy rain or exceptional heat, they will need retreat to the underwood and leafy shade of the *monte* ; whilst, on the other hand, in time of drought, there will be the *bañado* to which they can be driven for water, and where they will even find a supply of fodder, when the sun has scorched up the grass on the plains.

The combination of lands having these several necessary characteristics is to be found more especially on the left bank of the Parana, which consequently offers superior advantages for the establishment of estancias. Many of the same features are found throughout the region which includes Uruguay, the Argentine Mesopotamia, Paraguay and Matto Grosso, as well as the Rio Grande do Sul. And it should be noticed that the farther we advance to the north the better do the ranches become, so that the cattle of Paraguay have a higher market value than those of Corrientes ; and Matto Grosso, in a still higher latitude, produces the Miranda breed, which is reputed to be the finest in South America.

All the beasts bred on the right bank of the Parana, that is, in the provinces of Buenos Aires and Santa Fé, in Chaco, and even as far north as Descalvado, are so inferior in quality as to be much less marketable ; instead of carrying the proper amount of meat, they fall short of it by 20 or 25 per cent., and the prices they fetch are diminished in proportion.

A further condition under which cattle farms, to be successful, must be carried on, is that they should never be overstocked. A square league of land, as has been observed, cannot be estimated as capable of maintaining more than 2,000 heads of cattle, which is about one animal (not reckoning the *crias*, i.e., the calves) to every hectare of two and a half acres. It seems a reasonable estimate, because it has to be considered that the estancias of Paraguay do not consist entirely of pasturage ; but as the grass that is grown is more than sufficient to keep that number, I feel sure that the regulation (now indeed almost obsolete) was too restricted by which the Republic required that only a single beast should be allowed to every two *cuadras*, or about four acres of land. The Argentine Government, in-

deed, under certain circumstances, allows 4,000 heads to the square league, but then it has to be taken into account that the league is reckoned as 2,500 hectares instead of 1,769, i.e., 6,180 acres in place of 4,370. Moreover the Pampas are much more uniformly flat than Paraguay, and consequently have a larger area of pasturage, which must surely justify the assigning them a higher ratio of beasts to be kept.

In Rio Grande do Sul and Monte Video, where a league is computed at the extremely high standard of 4,356 hectares (11,640 acres), the limit of animals put upon it must not exceed 2,500, allowing only one beast to every 4.6 acres; in the Parana province, the rule is to allow but one to every ten acres.*

Another condition to be kept in view for the profitable working of a cattle-farm is that due regard must be paid to the proper season for calving, a matter that in Paraguay has not been taken sufficiently into account. Far too frequently calving will take place about October or November, just at the beginning of the hot season, when insects of all kinds are about in swarms.

This entails a great mortality; the young calves, as the people of the country say, "*se agusanan*," by which they mean that the larvæ of the flies are deposited in the unhealed umbilical cord, causing frightful ulceration. The remedy to which the estancieros resort is the application of medicated glycerine; it is often found effectual, but it involves a great deal of hand-labour, and after all fails in many cases.

Much of this mortality might be obviated by due precaution. By isolating the bulls at a proper season of the year, there need be no difficulty in providing that the cows and heifers should calve in the winter, when flies are so scarce as to minimise the risk of their causing inflammation of this destructive character.

During the winter it should be seen that every beast of two years old is properly branded with the "mark" of its owner.

In Paraguay, the prevailing practice is to allow three bulls to be reserved for each hundred heifers. Production would

* St. Louis County, *Rapport au ministre de l'agriculture et du commerce*, Rio Janeiro, 1880.

ordinarily be at the rate of 25 or 30 per cent. on an entire herd, which would imply 80 or 90 per cent. increase on the cows. This number is large compared with what is found to hold good for the Brazilian province of Parana, where not more than half the cows calve annually.

Such returns must be acknowledged to be very satisfactory, although, no doubt, the results are inferior to what they would be with herds of domesticated cattle. As Dr. Couty remarks,* the wild state is not favourable to reproduction; but it is hardly fair to apply the term "wild" to such cattle as those which are bred and reared in the estancias of Paraguay.

What should be the expense of stocking a cattle-farm is obviously a question of prime importance. The average cost per head of cattle that is bought *al corte* (that is, one with another, without selection) may be set down at 10 pesos (£2). It should, however, be noticed that in certain localities the price is far lower, being at Corrientes only about 4 or 4½ pesos, and at Buenos Aires even less.

After making due allowance for losses, and reserving a sufficient number of heads to keep up the stock, it is usually computed that about 15 per cent. of the whole herd could be sold annually. This is nearly the same proportion as at Buenos Aires, and somewhat higher than that in Rio Grande do Sul, where it rarely exceeds 12 per cent. In Parana it is only 5 per cent. There have been highly favoured districts in Uruguay and Rio Grande in which it has reached 20 per cent.; but this is quite abnormal, and in the very same places it has been known to sink even below the rate of Parana.

It is customary in Paraguay to sell only the three-year-old *novillos* (young bullocks) and the cows that have ceased to be productive. For *novillos* sold on the estancia, an average price would be 18 to 20 pesos, and the same animals delivered at the slaughter-house in Asuncion would realize from 28 to 30 pesos, according to the state of the market. If taken to Fray Bentos, to the great Liebig Factory, they would frequently not fetch more than 12 pesos in gold piastres, equivalent to 19

* Couty, *Report, ut sup.*, p. 155.

paper pesos of Paraguay ; but the price varies, and on an average may be reckoned at about 25 pesos a head.

In the neighbourhood of Curutiba and San Paulo production would seem to go on more slowly, as the novillos are not sent away for sale until they are more than four years old.

Hitherto there has been no systematic attempt at cross-breeding, like what has been tried at Buenos Aires. On some few of the estancias there has been an importation of a limited number of Durham oxen, but at present it is difficult to decide what success will follow the experiment. It is quite probable that in Paraguay it may answer better than in Buenos Aires, where the coarse and inferior quality of the forage has had a degenerating effect upon some of the imported stocks. The pasture of Paraguay is certainly of a finer quality, and may lead to better results ; but still it is being over-sanguine to expect much good from such an arbitrary selection. Before cross-breeding could be introduced with advantage, the entire system of American cattle-farming, which is still very primitive, would require many modifications, and these would be far too costly ever to be remunerative.

As yet, the meat-trade has become no element of Paraguayan commerce. It is said, however, that a large *saladero* is going to be started by one of the principal manufacturers of preserved meats in the neighbouring province. It is a want that has been long felt, and I can hardly doubt that, in the course of a few years, several factories of the kind will be found established in the country, and doing a large trade. The superior quality of the Paraguay meat will be an inducement to manufacturers who have found the Buenos Aires meat so lacking in richness as to make it difficult for them to utilize it as they want. The sole reason why such establishments have not been erected earlier has been because the ranches have been too limited in number and extent to meet the demand of the slaughter-houses.

As the cows are not kept in confinement, as a rule they are not milked, but the milk is left entirely for the calves ; anyhow, it would not be sufficiently abundant for dairy-work. A number of domesticated cows are set apart to supply the material

for making cheese, of which a considerable quantity is required; this is for the most part eaten dry, but it is likewise used as an ingredient of some of the meat-dishes that are relished by the people, and known as *chipa*, *sopa*, *queso*, and *fideo*; it is never allowed to be fermented, but is always eaten as cream-cheese. The home produce does not meet the demand, in consequence of which over 20,000 lbs. of ordinary cheese was imported, in 1886, from Uruguay, and still more of recent years.

Fancy cheese, which comes direct from Europe, and is not made in the country, is now being consumed in increasing quantities. In 1887, over 12,500 lbs. were imported, against only 6,500 lbs. in 1886, a large advance for a single year. Cheese of every kind is subject to an *ad valorem* duty.

As in all Spanish countries, butter is scarcely known, as fat and oil are mainly used for cooking purposes. Salt butter, however, is beginning to be required to meet the demands of the immigrant population, and, in 1886, 3,000 lbs. were imported, a quantity which rose, in 1887, to 4,200 lbs. Some effort has been made to start butter factories in the colony of San Bernardino, and what is made is of good flavour, and finds an easy sale in Asuncion. It is a branch of dairy-work which may be expected to grow, as it has done in Argentina, and even in Spain itself, where, for ages, good cooking was almost unknown.

It may be added that another use for milk is found in the preparation of a kind of sweetmeat, called *dulce de leche*, which is much appreciated by the country-folk.

The number of bullock hides exported in 1887 was 69,234, whereas, in 1884, it had been only 40,535.*

Besides this, there was an export of 22,000 horns, and over 25,000 lbs. of hair. The trade in neats'-foot oil is yet only in embryo, as the quantity sent away in 1887 was scarcely 10,000 lbs., which is quite insignificant when compared with the number of the oxen which are reared. Here, then, is another branch of commerce that has to be developed.

* Value, 1888, 219,183 pesos; 1890, 323,244 pesos.

Tanneries in the country are somewhat numerous. The bark of a good many of the trees, such as the *crebracho* and the *curupai*, contains a large quantity of tannin, and San Paulo ~~and other~~ it cannot be said that there is a large quantity of tanned hides, as the official report makes a return to the effect that only 311 were exported in 1887; the import of leather, on the other hand, was considerable, so that the revenue derived from what was brought into the country for shoes and harness-making amounted to little short of £8,000.

The difference between the export and import of tanned skins is remarkable; it is in great measure to be accounted for by the existing tanneries being in the hands of owners with insufficient capital to extend their plant, and their resources generally being so limited, that they cannot produce an article to compete with the leather of Europe. It is so not only in Paraguay, but in all the La Plata States, and it is strange that Europeans have not taken advantage of the opportunity to commence a business that could not fail to be remunerative. One effort has indeed been made in this direction, and the character of the work which is being undertaken was shewn in an interesting way by the tanned crocodile-skins and snake-skins that were sent to the French International Exhibition of 1889.

HORSE-BREEDING.—Next, as to horse-breeding. This is a business that is held in high repute in Paraguay; it is quite common for anyone who has managed to save a little money to invest it in horse-flesh, and to mount himself, like a *gaucho*, upon an animal decked out from head to tail with a lot of silver ornaments; or he will be seen riding at the head of a string of horses that follow him, but of which he will ride every one in turn, to prevent any of them being over-fatigued.

Paraguay horses are small, but well formed and capable of a fair amount of work. They are sure-footed and able to go for a considerable time without food. As a rule they are kept on grass, but when that fails they take very readily to the leaf of the pindo palm, and thrive upon it very well; but there are several kinds of forage, like lucerne or *pasto angola*, that are

found serviceable. Some of the draught-horses will feed off maize (the *abati atá* of the country); and these are described as an ingredient of which distinguishes them from those that will only eat grass.

Horse-racing is the most popular of pastimes; and there is hardly a village, however remote, that does not have its *carreras* several times a year. The horses that run are specially trained, and in order to improve the stock an endeavour has been made to introduce half-breeds from the Argentine Republic.

In 1877, the computation was made that the number of horses in Paraguay was 21,140; by 1890 it had grown to 99,691.

It is affirmed that the profits of a stud-farm reach 20 per cent. on the capital invested; but, whatever they are, they would be considerably more if the foals were carefully tended, instead of being left exposed to all the inclemencies of the weather.

The general degeneracy of all South American horses is due to the utter neglect of judicious selection elsewhere. Mares are quite depreciated, and few equestrians would like to be seen riding them. Colts that have been gelded quite young are brought into the market for sale. Owners, eager to get money quickly, part with the best of their stock, reserving for breeding purposes only such as would find no purchasers because of some physical defect. This way of doing things is just as common in the Argentine Republic as it is in Paraguay. Occasionally wealthy owners in Buenos Aires will allow themselves the luxury of a costly stallion or two, but it would always be with the design of enhancing the reputation of their racing-stud, and not in the least from a wish to improve the breed of the Argentine *cabañas* for ordinary service. A report was recently current that an Argentine horse-breeder had given £20,000 for three English stallions. It is very certain that the importation of these high-priced creatures would not have the slightest effect upon the national breed, and the purchase could interest no one except the habitués of the racecourse.

As it must be all the world over, the prices of horses will

vary according to their qualities ; many of those in common use would be valued at from 20 to 30 pesos ; but a thoroughly nice horse could be bought in Paraguay for 100 pesos.

MULES.—For draught, mules are more frequently employed than horses, as being better able to endure the extreme heat, and a team of five or six of them is often put to draw a cart. The number of them in the country, as given by the Statistical Authority in 1890, was 2,433, but I have an impression that this is considerably below the truth. Their market price much exceeds the price of a horse, and a fairly good mule could not be bought under 50 to 60 pesos.

SHEEP.—In former years there were a good many large flocks of sheep to be seen, but it could never be said that they were a fruitful source of profit. The summer temperature is too high, the fodder is too coarse, and the brambles are too thick to suit them, and it is difficult to maintain them in a thriving condition. Yet attempts are being made to acclimatize some of the European breeds. One praiseworthy effort was made by M. Aceval, but, in 1886, an epidemic broke out and carried off the bulk of his flock ; he has not, however, given up the venture in despair, and it is to be hoped that he will reap a good reward for his perseverance. Of the 62,920 that were enumerated as making up the total of the sheep in the country in 1890, the larger proportion were in the districts of Caapucu, Caarapa, Carapegua, and the Misiones.

PIGS AND GOATS.—Pigs are bred, but in very small numbers, and it is reckoned that there are not 11,000 in the whole Republic. Goats are scarcely more numerous.

CHAP. IV.

AGRICULTURAL PRODUCTS.

Cereals—Wheat, mills and bread—Galleta—Maize—Gen. Escobar's experiments—Marvellous fertility—Rice—Barley—Farinaceous foods—Sopa fideos—Breweries—Manioc—Humboldt's axiom—Potatoes—Sweet potatoes—Tomatoes—Beans—Onions—Increase of azotic food—Augury of progress.

WHEAT.—Cereals are only grown in Paraguay for home consumption. Years ago the cultivation of wheat was considerable, and Azara tells us that Paraguay sent supplies of it to Buenos Aires*; but lately that grain has ceased to be cultivated almost entirely, and that in great degree because it had so degenerated as scarcely to give a four-fold yield.

In the course of his journeys, Dr. Demersay noticed some wheat-fields in the environs of Villa Rica, and in several parts of the Misiones.† For my own part I have no knowledge of any being sown, but I have documentary evidence submitted to me that 467 acres of land were allotted to its cultivation in 1863. There are various reasons for its disappearance, but the main causes are the indifferent system of agriculture, and the lack of discrimination in the selection of the seed.

It is useless to think of making any immediate change in this respect. Cereals, as previously explained, thrive well enough upon the great plains of both Americas where the soil is unsuited for the production of more exacting crops; but in hot climates, where the soil is both heavy and fertile, it is better to sow what will take up the largest amount of nutrition that the earth yields, and fetches the best price in the market. So that, although there is no doubt that wheat would grow in Paraguay just as well as it grows in Russia, it would hardly seem advisable at present to push its cultivation. The supply from the Argentine territory is so good, and the

* Azara. *Voyage*. Vol. I., p. 139.

† Demersay. *Histoire du Paraguay*. Vol. II., p. 93.

consumption so comparatively small, that there is little likelihood of any deficiency being experienced. There is no import duty, and the average local price is about 6 pesos for 100 kilogrammes, which is at the rate of about 7 shillings a bushel.

Of late years, since mills with porcelain rollers have been opened at Asuncion, wheat has been imported in grain, the quantities in 1886 and 1889 being 75,000 bushels and 131,880 bushels respectively; meanwhile the importation of flour has fallen to 15,540 cwts. This is explained by the excellent work done by the mills at Asuncion, where the quality of the flour produced is so good that it finds purchasers even beyond the borders of the Republic. In 1887, the Asuncion custom-house passed 1,420 cwts. of wheat flour for Matto Grosso, whereas not one single pound had been sent the previous year. After having ground 14,000 cwts. of flour in the year 1887, M. Saguier's mill, as the proprietor himself informed me, produced 18,200 cwt. in 1888. In addition to this, M. Quaranta's new steam-mill turned out 5,520 cwt., so that the total for the year was 23,720 cwt.

As this gives an average of only 13½ lbs. a head for each inhabitant, it shows how small is the consumption of bread. Maize and manioc are the usual materials used for food. The demand for wheat, however, is likely to improve, if we may judge from the increasing consumption of ships' biscuits, and the increasing number of foreign settlers. For the present its consumption is artificially checked, owing to the exorbitant price which the bakers charge for their bread.

Ship-biscuits are known as *galletas*. A few months ago I saw them sold at 3d. a pound; at the end of 1888 the price of the best quality was 2½d., an inferior quality being sold at 1½d., while bread fetched 4½d. per lb. Prices such as these might be consistent enough in the hard times of Lopez, when none but the wealthy thought of eating bread, and no wheat at all was grown in the Argentine Republic; but now that wheat in Asuncion does not cost much beyond a penny a pound, and has been exempted from customs duty, there is no reason whatever why the bakers should be permitted to

maintain so preposterous a price. Colonists, however, could, at any time they please, put an end to the exaction by starting co-operative bakehouses for themselves.

INDIAN CORN.—Still, so long as Indian corn or maize continues to be the staple commodity in demand, it is hardly likely that the importation of wheat will largely increase. The use of maize has been long universal, and strangers very soon get accustomed to it; its nutritive and fattening properties are undeniable,* so that M. Dujardin-Beaumetz is perhaps justified in saying that “we can quite understand the tendency there is to substitute maize for wheat.”†

There are several kinds of maize in Paraguay. First, there is the white maize, known as *abati-moroti*. (*Zea mais vulgaris æstiva*). The flour of this is mixed with fat and cheese, making a kind of bread called *chipa de maïs*, to distinguish it from that which is made of manioc-meal. In this preparation the maize has to be pounded in a mortar and separated from the albumen, which is used for making a sort of cake called *yrona*. Maize of this sort is also eaten grilled; it is called *asado* when it has been roasted on a spit, and *tosado* when baked in a frying pan.

A second variety is the hard maize, *abati atá* or *abati tupi*. (*Zea mais autumnna*). The grain of this is very hard, and is mainly used for feeding horses; but when it has been divested of its husks, it is utilized for making two very popular dishes, one known as *locro*, which consists simply of the grain well boiled; the other as *mazamorra*, in which the grain, after

* The analysis of maize as given by M. Boussingault is—

Nitrogen.....	12·8
Starch.....	58·4
Dextrine and Glucose.....	1·5
Fat.....	7·0
Cellulose.....	1·5
Salts.....	1·1
Water.....	17·7
	<hr/>
	100·0

† Dujardin-Beaumetz. *L'Hygiène alimentaire*. Paris. G. Doin, 1887.

being soaked, is mixed with milk and a little sugar. These constitute the staple food of all the inland districts. The Indians also eat it, either roasted or pounded into a kind of coarse *chipa*. They also use it in the production of *chicha*, a fermented liquor, obtained by first chewing the corn. The salivary diastase acts as a ferment, and results in the production of a small quantity of alcohol. During my stay among the Indians on the Ygatimi I tasted this *chicha* several times, and to me it always appeared a somewhat sour and insipid drink, without much of either alcoholic smell or flavour; but so little have the Indians been accustomed to fermented liquors, that half a glass goes far towards intoxicating them.

Thirdly, there is the red maize, *abati pyta*, also called Brazilian maize. This is merely a sub-variety of the *abati atá*, being equally hard, differing from it only in colour and in the quickness with which it ripens. It is used for the same purposes, except that it is not given to cattle.

A fourth sort is what is known as *abati pichinga*. The grain of this is small, and not only is it hard, but it is pointed and prickly, so that cattle refuse to eat it. Not unfrequently it is spoken of as *abati poroso*, the noisy maize, because when it is fried in fat it cracks and crackles.

A further variety is the *abati gaycuru* (*Zea maïs tunicata*), differing in various respects from all the preceding. It is very little used, and I only mention it on account of its having been described by Azara as indigenous to Paraguay. Its peculiarities consist in its having a very stiff, thin foliage, and in the grains (which are quite small) being separated from each other by little leaves. To a certain extent this sort is grown in the south of France, where it is given to poultry, and supposed to fatten them, but its chief use there, as in Paraguay, is as a serviceable material for making brooms.

Such are five different varieties of maize found in Paraguay. Dr. Demersay, Parodi, and other writers, have more or less confounded them one with the other, and it is on that account that I have thought it desirable to describe them individually.

As the soil is so thoroughly suited for its growth, maize is not likely to degenerate as wheat has degenerated. It

thrives even better on a newly cleared *rosado* than in a ploughed field. On well-cultivated farms there ought to be no difficulty in getting in two crops a year; this, however, is rarely thought of in Paraguay, where the people are far too indolent to sow anything beyond what is necessary for their own consumption. If agriculture is, however, carried on on commercial principles, two harvests a year may as a rule be depended on. In the time of Lopez, when so keen a stimulus was given to agriculture, it is known that there were certain farmers who made two sowings in the year.

The very least that a grain of maize should be reckoned to produce is 100 grains, and the yield is not unfrequently found to be from 600 to 800. A great deal depends upon the way in which it is sown, and if it were drilled in there is no doubt the increase would be still larger.

General Escobar told me of a circumstance that shews how remarkably well-adapted is the virgin-soil of the Central Parana for the growth of this cereal. In 1880, while he was carrying out his great design of constructing roads and bridges to open up the yerbales of Tacurupucu, he had maize sown in the large *campo*, adjacent to his *pueblo*, for the sustenance of the labourers who were engaged on the works. This was done in the most primitive way, without any preparation of the soil, and yet the 102 arrobas (19 bushels) of seed sown yielded no less than 72,000 arrobas (14,990 bushels). Such a fact may well be recorded among the *notabilia* of the annals of agriculture.

Generally, on average soil, the return would be 200 arrobas to a *cuadra* (about 4,800 lbs. to an acre).

The satisfactory results that have been obtained seem to have very much encouraged the cultivation of maize; at any rate, the consumption has very considerably increased. In 1863, when the population exceeded 800,000, there were not more than 15,000 acres sown with it; in 1889, with a reduced population, this area had increased to 41,000 acres, whilst the importation of maize is by no means inconsiderable. At Asuncion the price of maize is continually fluctuating, not so much on account of bad seasons, but rather because the area sown with it varies from year to year. Low quotations check its cultivation, high prices unduly expand it.

In June, 1889, maize was being sold at Asuncion for 1\$ 40c. (4s. 6d.) the arrobe of 25 pounds; and four months later it was only about a quarter of that price. During seasons of "scarcity," the importation of maize assumes considerable proportions. The imports, in 1886, amounted to 17,436 cwt., in 1887 they fell to 8,446 cwt.; in 1888 they rose again to 14,518 cwt., and in 1889 they were 45,646 cwt.

Although maize will hardly be allowed to rank as a high-class crop, yet the facility with which it is produced in such abundance, and its importance as an ordinary item of domestic consumption, cannot fail to secure it a prominent place amongst the products of the country. The horse-breeding, too, which is daily on the increase, is certain to make a continual and growing demand for the hard maize.

RICE.—Rice is another commodity for the cultivation of which many parts of Paraguay are admirably adapted. All the lands adjacent to the rivers, lakes, and *bañados*, suit it well. Already, to some limited extent, it has been grown on the river-bank below Asuncion, and in the environs of Atira, Tobati, and Emboscada. Facilities for irrigation in these places, and others like them, are so ready at hand that the rice cultivation might, without difficulty, be so developed that Paraguay should be in a position to compete in the La Plata markets with the vendors of rice from Europe and Asia. It is a crop requiring but little manual labour, and all that I have seen have wanted nothing beyond a single weeding. According to Du Graty, rice yields 200 to 250-fold, and a *cuadra* is usually supposed to yield 250 arrobes, which is equivalent to 3,400 lbs. to an acre. This yield, however, could be vastly improved upon by better methods of cultivation.

Samples that have been shewn me are, as far as my judgment goes, equal in quality to Carolina rice. The grain is smaller, and it has a minute black speck at its extremity, but in weight is superior to any of the rice that is imported, and experts pronounce its flavour to be finer.

Hitherto there has not been enough rice grown to provide

for home consumption, which is daily becoming larger. This increase is owing partly to the arrival of foreigners, particularly Italians, who have always been accustomed to use it, and partly to the practice, which is getting common, for the country people to take their *guiso* of rice as a change from their *puchero* of maize.

In 1885, only about 5,640 cwts. were imported, a quantity that differs hardly at all from the average of the previous five years, during which the number of immigrants was small. In 1886, 7,960 cwts. were imported; in 1888, 13,880 cwts.; and in 1889, 13,770 cwts. In 1887, rice was actually imported from the Brazilian province of Matto Grosso, which does not produce sufficient cereals for its own consumption.

Rice pays an import duty, and retail dealers at Asuncion charge 65 cents a pound. The wholesale price is 1\$ 40c. to 1\$ 60c. per arroba for foreign, and 80 to 90 cents for home-grown rice. This shows, at all events, that the cultivation of rice would amply repay the husbandman.

The area planted with rice at the present day is not quite equal to what it was in 1863, when it amounted to 1,540 acres; but as the population has considerably decreased since then, the consumption per head is very much greater. It may fairly be doubted whether this increasing popularity of rice is a matter for congratulation. I doubt it. Rice is, no doubt, very fattening, but the Paraguayan already takes sufficient starch in the shape of manioc and sweet potatoes. Maize, which is so rich in fats and sufficiently so in nitrogen, has a much higher alimentary value than rice, which only contains 6.43 per cent. of nitrogen and 0.43 per cent. of fats. Rice, in fact, can only be recommended when eaten with meat instead of bread.

OTHER CEREALS.—Beyond wheat, maize and rice, the cultivation of other cereals is very limited. Neither barley, sorghum, nor oats can be said to be absolutely unknown, but it is only the first of these that covers any area worth noticing. In 1886, no more than thirty-five acres were known to be sown with barley, and these were almost entirely in the valley

of the Tibicuary. It was certainly grown much more in 1863, when the acreage was 877; but it is one of those crops that is not likely to become popular with the agriculturists, as it is not profitable.

An attempt has been made to utilize the barley by malting it for beer, the demand for which has been considerably increased. The import of beer in bottles has indeed remained pretty well stationary, whilst the consumption has increased, thanks to the establishment of two breweries, the one at Asuncion, the other at S. Bernardino. The former is managed by a Frenchman, the latter by a German.

The industries depending upon Cereals are becoming of importance. We have already seen that two mills have been established at Asuncion, where imported wheat is being converted into flour. For the present, these two millers enjoy a sort of monopoly, and are able to charge 1\$ 20c. per arroba of flour, thus sharing with the bakers the responsibility for the high price of bread.

Factories have likewise been established for the production of farinaceous food, two of them being of considerable importance. These 'Italian pastes' or "fideos," owing to their portability and durability, are often preferred to bread. They have long been known in the country, and one of the national dishes, *sopa fideos*, is a palatable mixture of boiled venison with tomatoes and eggs. The home produce no longer suffices for the requirements of the country, and annually about 1,200 cwts. of these pastes are being imported.

MANIOC.—Manioc, called *mandioca* in Spanish, and *mandiho* in Guarani, belongs to the order of Euphorbiaceæ, of the Croton tribe. It is of several varieties, the one chiefly cultivated in Paraguay being the *manihot aypi*, or *mandioca dulce*, which has been accurately described by Parodi. It is sometimes pure white, and sometimes it has a pinkish hue, whence it derives its local names of *mandiho moroti* and *mandiho pyta*. Another kind which is quite as much used, though it is not equally succulent, is the *mandiho ta poyoha*. Its colour is a greyish white, and its root is knotty. There is yet another

kind, which chiefly grows wild, and is called *mandiho guazu*; this is generally kept for feeding cattle.

All these varieties are perfectly harmless, and must not be confounded, as some authors have done, with the bitter manioc, *mandihot-ró* (the *mandioca brava* of the Spaniards), the milky juice of which is an irritant poison. It is extensively cultivated in Brazil, where, after the poisonous narcotic substance has been removed by pressure, it is employed in the preparation of *fariña* and tapioca. Some writers affirm that the juice, while it is fresh, has no poisonous properties, but that the hydrocyanic acid it contains is the result of fermentation.

The *aypi* manioc is the substitute for bread with the great mass of the population. It is either boiled in a *puchero*, or simply baked in the embers; but cooked anyhow, it is always much preferred to the potato, which is by no means a favourite food in South America.

Another use which is found for the starch extracted from manioc is in the preparation of *chipa paraguaya*, a kind of cake made up with cheese and eggs, a little milk being occasionally added to render it lighter, and to improve the flavour.

The *fariña* or tapioca, which is so much used in Brazil, is made exclusively from the *manihot-ró*. A kind of bran is produced during the process of manipulation known as *typirati*; this is also eaten, but only by the poorer classes.

Baron Humboldt has stated that a people who had learnt to cultivate the manioc, had taken one step in advance towards civilization.

However this may be, in Paraguay, the cultivation of the manioc appears to decrease in proportion as civilization advances. In 1863, 51,556 acres were planted with it; in 1889, only 31,670 acres. This decrease is by no means accounted for by a decrease in the population. It shows rather that the alimentary resources of the people have become more varied, and that maize, wheat, and other cereals have largely taken the place of manioc.

SWEET POTATOES.—The same remark applies to sweet potatoes

or batatas, the cultivation of which has been so much on the decline that, while in 1863 there were 1,922 acres planted with them, at present, as the Statistical Report shews, there are only 1,386 acres of sweet potatoes and ordinary potatoes altogether.

MARKET-GARDENING has hitherto, no doubt, been of small account in Paraguay, yet it should have, I believe, good prospects of future development. I need not try to enumerate all the vegetables and fruits that might be advantageously grown in the *chacras* all around Asuncion and in the interior of the country. Suffice it to say that there is hardly a European vegetable but what could be perfectly acclimatized; what would first be wanting would be that the taste of the population should create and maintain a demand. I have previously given my opinion about the possibility of forwarding vegetables, especially early vegetables, to Buenos Aires and Monte Video, so that Paraguay should render a service to those markets corresponding with what Algeria does for France and England; and I entertain little doubt that the effort, once made, would be rewarded with success.

One indispensable requisite, as yet lacking, is the gardener. Good practical knowledge is wanted alike about the chemical qualities of the soil, the proper way of treating it, and the right crops to plant; of all this the inhabitants are quite ignorant. The only kinds of garden produce in which they manage at all well are beans, onions, and tomatoes, and these demand nothing but the most elementary skill.

From the port of Asuncion alone there were sent out, in 1887, no less than 8,700 cwts. of tomatoes; and yet, by a strange anomaly, preserved tomatoes were imported from Europe to the amount of 2,477 gallons, nearly the entire produce of a manufactory. General Sarmiento, one of the worthies of the Argentine Republic, living in Paraguay for the last year of his life, was much struck by the circumstance, and conceived a plan for making a tomato-plantation on his property at Asuncion; his death prevented it from being carried out, but a scheme so promising is hardly likely to fall through ultimately.

Beans, which are regarded as superior to sweet potatoes in their nutritive properties, are now used much more than formerly as an article of food. In 1863 there were only 2,725 acres under cultivation; in 1889 there were 5,696 acres, a number which, considered in reference to the population, would make it appear that the consumption has increased fourfold.

Onions, on the other hand, have been less cultivated than they used to be, having fallen from 847 acres in 1863, to 222 acres in 1886. The greater part of these were grown in the fields at Yaguaron and Caazapa.

From the preceding statements a general idea may be formed of the difference of the mode of living in the time of Lopez from what it is now. The change is in a right direction. Nitrogenous foods have gradually taken the place of succulents, and wheat, maize, and beans are being substituted for sweet potatoes and manioc. The improvement in diet will have its influence on the future development of the country. Inadequately nourished as the people were, they were capable of getting through a very limited amount of work, merely satisfying their absolute needs, and leading an indolent, unenterprising life. As a result of being sustained by more nourishing food, they are beginning to show something of the energy that alone can make a nation take its proper part in modern progress. That the condition of the population is bettered, is a conclusion that obviously must be drawn from the comparison of the Schedule of Imports now, with what it was in 1855. The country may not yet have started industrial works of its own, but it is persistently enlarging its demand for the productions of the industry of Europe; and this I contend is an uncontrovertible sign of advancing progress in the people of Paraguay.

CHAPTER V.

AGRICULTURAL PRODUCTS—(*continued.*)

The Vine—Cultivation in former years—Importation of wine—Fresh attempts at vine-culture—Expense—Profits—Two harvests a year—Sugar-cane—Varieties of cane—Plantations—Produce—Paraguay rum—Introduction of alcohol—Coffee.

At present, the vine in Paraguay is only cultivated for the sake of grapes for the table, but in the 17th century its cultivation was carried on extensively. Azara* tells us that the vineyards around Asuncion were stocked in 1602 with vines forming rows of a total length of two million feet, and that wine was actually exported to Buenos Aires. This is confirmed by Father Charleroy in his work upon the Jesuit Missions. As recently as 1850, vines planted by the Jesuits still existed at the Mission de la Cruz in the Parana valley; and Demersay,† who saw the remains of these vineyards, says that the wine that was made there was highly appreciated on the Rio de la Plata.

What can be the reason for this absolute stopping of vine-culture in a country that is so admirably suited for carrying it on?

Some there are who profess to have found an explanation in the flocks of birds and swarms of insects that infest the region; some again have attributed the neglect of the vineyards to the fact that the people, having discovered a ready way of getting alcohol from sugar-cane, became indifferent to the grape; but I am not inclined to attach much weight to either of these two conjectures. It is quite possible that at some time or other a scourge, like the phylloxera in France, may have devastated the vineyards; but the notorious indolence of the people, to my mind, is quite sufficient to account for their decay. Their proper maintenance demands the systematic

* Azara, *Voyages*, Vol. I. p. 141.

† Demersay, *Histoire du Paraguay*, Vol. II., p. 107.

labour of years; the vines have to be renewed periodically; the soil has to be tilled with persevering regularity; and the working altogether requires an amount of industry beyond the capability of a Paraguayan native, who, after finding the vineyards established by the Jesuits, would be quite content to gather grapes while they lasted, but would give himself no concern about perpetuating the supply. A few years of this neglect would be fatal, and what could be expected after two centuries and more?

It is only by immigration that vine-culture is ever likely to be brought back to its ancient standard; but beyond doubt it is an industry to which a colonist might well turn his attention. Apart from the probability that wine could be exported, there is the certainty that the local consumption is so steadily increasing as to ensure the speculation bringing in a handsome return.

Tables that have been furnished to me by the Statistical Office shew that in 1887 the import of wine at Asuncion was 1,682,217 litres, being an increase of 588,056 litres on the import of 1886; when to this is added the import of the minor ports, as Villa Concepcion, Villa del Pilar, and Villa Encarnacion (140,000 litres), it will be seen that the total import for 1887 was 1,822,217 litres, a high figure when compared with 1860, in which year Du Graty estimates that the total value of the wine imported was £10,250.*

The consumption of wine is certain to increase with the improved condition of the population, and hence the present must manifestly be an opportune time for commencing the work. Already some minor undertakings have been started, vineyards having recently been planted by M. Decoud near Asuncion, and by M. Caron near Aregua.

Considerations as to the cost and return of the vine-culture are of the highest practical moment. With regard to these I would venture to submit an estimate which has been kindly furnished by M. Gibrat. It is made for one hectare (2·47

* Du Graty, *La République du Paraguay*, p. 397. The value in 1887 was £42,520; in 1889, £49,250.

acres), out of a vineyard covering 50 hectares (124 acres), and embraces a period of ten years.

M. Gibrat's statement is as follows :—

EXPENDITURE.

	Dols.	£
Price of 1 hectare of land, upon railway or on the Rio Paraguay.....	10	= 2
Clearing.....	50	= 10
Vines and planting	200	= 40
Sheds ; vats, appliances, &c., 5,000 dols. ; or per hectare	100	= 20
Labour, repairs, &c. 100 dols. a year, for ten years	1,000	= 200
Total	1,360	= 272

RECEIPTS.

	Dols.	£
Eight gatherings of 23 bordelaises of 50 gallons each (184 bordelaises in all) at 40 dols.....	7,360	= 1,472
Leaving clear profit, with capital redeemed, for ten years' labour	6,000	= 1,200
Clear profits for each harvest	750	= 150

The figures in the above require some explanation.

An annual average of 23 bordelaises as the produce of one hectare may appear to be very low, but it was assumed for the sake of avoiding disappointment. In the south of France an ordinary yield is from 40 to 50 bordelaises. Admitting that in Paraguay it would be only 30 bordelaises, and deducting a further 25 per cent. from that to meet contingencies of damage by ants or wasps, there remains the adopted estimate of 23 bordelaises ; it would be unreasonable to take a lower estimate, or to allow more for unforeseen accidents.

It has also to be taken into account that *vin ordinaire* is sold at Asuncion at about £14 or £16 a cask of 210 litres, the Coustau brand, for instance, fetching £14 8s. the cask ; it follows, therefore, that in valuing the bordelaise of 225 litres produced on the Paraguay plantation at 40 dols. or £8, a large allowance will have been made for the depreciation which might affect a local production, as well as for the ignorance about the true quality of the vintage.

A very large proportion of the wines that are brought into Asunción is more or less adulterated. There are stores both at Monte Video and at Buenos Aires which do a great deal of this nefarious traffic, and it is extremely difficult for the authorities to suppress it. But no sooner shall the cultivation of the vine have been well established in the country, than the Government would at once raise the duty on all alcoholic liquors, not simply as a protection for the home producer, but likewise in the interest of the public health; and such are the circumstances under which it may be maintained that the price of £8 per *bordelaise*, as adopted in the estimate, is not likely, for a long time at least, to sink any lower. Thus, calculated at a minimum, the profits on a vineyard of 124 acres ought not to be much under £7,500 for a single harvest.

And while I speak of a single harvest, I would not leave it unnoticed that it ought to be quite possible to have *two* vintages in a year. The vine blossoms in September, and the grapes are gathered in November; if immediately upon this the vines are pruned, numbers of new shoots will burst out within a very few days, and these ought to be in blossom in January, so that a second crop should be ripe in March. This is an experiment which I have myself successfully tried upon vines that are exposed to the north, and there seems no reason why the result should be otherwise in vineyards that are more favourably situated. Colonists at any rate might do well to try the method for themselves.

SUGAR-CANE.—Next after the vine, the sugar-cane demands our attention. The cultivation of this is always associated with the agriculture of sub-tropical countries, and Europeans are ever being met with who appear to think that sugar-planting is the sole resource of the New World—in short, that sugar and America are synonymous. It need hardly be said that no mistake can be much greater, because the further a traveller goes, the less he will see of the *saccharum officinarum*.

One great reason is that sugar-plantations are not easy to maintain, because they are so liable to suffer from the inclemencies of the winter; but there is the further difficulty,

that they are so heavily handicapped by the competition of beet-root. As a consequence, nearly all over America sugar-planters are narrowing the breadth of their cane-lands, and it is solely in La Plata that sugar cultivation is unchecked, and that fresh *ingenios de azucar* are being established.

Tucuman was the first province to take up the sugar-craze, and millions have been spent there in the erection of plant with the most approved modern appliances. The French factory of Fives-Lille materially assisted the movement and supplied the bulk of the resources, but only to find that the competition of the beet-root sugar is so sharp that, notwithstanding the heavy duty imposed upon it by the Argentine Republic, it is barely possible for the Tucuman factors to pay their transport expenses to Buenos Aires. With the object of escaping the heavy railway rates for carriage, many of the plantations have been shifted to the banks of the Parana and the Paraguay, where the water conveyance is much cheaper. Sugar factories have thus sprung up in various parts of the Chaco, at Ocampo, Tacuarendi, Las Toscas, Resistencia, Formosa, and close to Corrientes. The Fives-Lille firm has throughout been the main promoter of the new establishments, and its American representative has just completed arrangements for taking in hand a new estate in the Upper Argentine Chaco, opposite the Paraguayan town of Villeta. During my recent journey in Matto Grosso, I may add that I found three new settlements of the same kind on the San Lorenzo and the Cuyaba.

It cannot be said that Paraguay has yet derived any advantage from the sugar industry, but it cannot fail to be benefited before long, and it is already reported that a factory, with a capital subscribed in England, is on the point of being opened in the Chaco, just opposite Asuncion. The site is good; for the nearer the tropics, the greater the prospect of success. If Tucuman, Corrientes, and the Argentine Chaco are adapted for sugar-growing, there is every reason why Paraguay with its hotter climate should be better still.

For many years the cane has been known by the name of Tacuare-ê (sweet bamboo). Four different kinds are cultivated.

First, there is the great white cane (called also the Portuguese cane) which was imported into Brazil about the middle of this century ; it is the same that was introduced by Bougainville from Tahiti to the Antilles and Cayenne.

Secondly, the small white cane, which is certainly the oldest known sort, and was probably brought in by way of Peru. It stands frost better than the great cane, and contains more sugar, but it does not yield so freely.

The third sort is the violet cane. This has been introduced from the Argentine province, Santiago del Estero, whither it was imported, at the beginning of the century, from the English colonies in the Indies. It is hardy, but much less watery and more woody than either of the preceding kinds. The juice contains a larger quantity of sugar (8° to 12° Baumé), but on account of its hardness, and the small intervals between its joints, it is not so amenable to pressure, and accordingly yields less than the white cane by about one-sixth.

The fourth kind is the spotted cane of Tucuman. This is the last introduction, and it has the reputation of giving an abundant supply of sugar.

Plantings of sugar-cane go on from August to November ; slips of about 18 inches in length are sunk a few inches in the ground, and should an insufficient reserve have been made, cuttings are easily procured for £1 a ton, which will plant over half an acre. Vegetation soon begins, and the time for weeding quickly follows, an operation which, if there is to be a good crop, will have to be done four times over during the year. Besides this, a good deal of trenching up has to be done, because the roots of the canes have a great tendency to work themselves out of the soil. All this labour, which is both tedious and costly, has now to be performed by hand, and it must be apparent how advisable it would be for new plantations to be set out with the rows wider apart, so as to allow for the use of the plough and the horse-hoe. The time of cutting in Paraguay corresponds with the time of planting, between August and November, as a whole year is given to the growth of the canes ; in Brazil, 18 months is required. An average plantation stands for eight or ten years. The

canes are cut, as they are cultivated, by hand-labour ; but the introduction of machinery into large estates would be a great advantage.

Hitherto the production of crystallized sugar has been very small. This the country people prepare in the most primitive way ; they merely leave the juice to concentrate itself in the bottom of some tubs, where crystallization will go on, but only to a very limited degree.

Almost the sole use to which the inhabitants of Paraguay put their sugar-cane is for distillation. Out of it they manufacture a *tafia*, known as *caña*, or Paraguay rum. This has an agreeable flavour, and is distinguished from the rum of the Antilles by its containing much less essential oil, being the direct produce of the cane-juice itself, and not extracted like other rum from the residuum of the sugar factories, or even, as it is known to be, from the scum, which is heavily charged with such oil.

Caña can be made in two different ways ; it may either be distilled from the pure juice, or from the juice after it has been allowed to get into the consistency of syrup or honey. The former of these methods is not very often adopted, because the sugar plantations are for the most part at remote distances from the distilleries, and the waggon-transport takes so long that the cane dries up, and is much deteriorated in value ; on the other hand, the grower, in spite of his rude appliances, obtains much more sugar by pressing out the cane as soon as it is harvested ; by this means he can allow the moisture to evaporate, and when the juice has become thickened into syrup, he can choose his own time for sending it to the distillery.

Such are leading causes why the distillation of the syrup is far more popular than that of the fresh juice. And a further reason may be added, namely, that fermentation in this case is a far less delicate process. At the same time there are many distillers who decidedly prefer the other method, on account of the yield of alcohol being 35 per cent. larger.

Distilleries abound all over the country ; there is hardly a village of any importance that has not at least one. The

retorts are generally of earthenware, and the operations, as often as not, are performed by women. The result is satisfactory, and nearly always uniform (making about 19 or 20 degrees Cartier, equivalent to from 10 to 15 degrees under proof). It is now some years since several European firms sent over a certain number of the stills known as Egrot stills; and these are in use at five factories, three of which are at Asuncion, one at Villa Hayes, and another at Martincue, between Yaguaron and Paraguari. Of these distilleries three are owned by Frenchmen, the others by a Dutchman.

A hectare ($2\frac{1}{2}$ acres) produces 30 tons of sugar-cane, and each ton yields 700 litres (154 gallons) of juice, if extracted by an iron press, but only 500 litres (110 gallons) if worked by one of the *trapichos*, or wooden mills, made in the country. I mean by an "iron" press, one that is worked by horses or oxen. In large factories, where steam presses have been erected, the produce would be considerably greater.

The sweet juices that are expressed show from 8° to 10° Beaumé, according to the season. After first fermentation, the average alcoholic standard is 9° Centigrade, upon which there is generally a loss of $\cdot 5^{\circ}$ to 1° Centigrade.

If the distillation is well managed, 500 litres of juice will produce $6\frac{1}{2}$ demijohns, or 78 litres of *caña* at 50° C. These figures refer only to the white cane, as this and the Tucuman cane are the kinds to be recommended for this country.

A hectare of land, therefore, ought to produce 2,300 litres of rum, which, sold at an average price of 17 cents per litre (3s. a gallon), would represent a return of nearly £80; it is an estimate that assumes the grower to be his own distiller.

If the grower is content, as soon as he has cut the cane to sell it, without further trouble, straight off to the distiller, he would make about £1 a ton, which is £30 for the hectare. If he is a good business man, he ought to be able to contract to go shares with the distiller, and in that case he should get £40 per hectare. But, as I have said, another plan is for the owner, after cutting the cane, to prepare his own syrup, which, as it will keep almost any time in leather bottles, he may sell just when he likes. An *azumbre* (about 37 lbs.) ought to be

worth nearly 7 shillings; and as, according to our calculation, a hectare produces 193 *azumbres* of the syrup, the sum realized would be £65. Except the planter distils his own molasses, this is the most profitable way of disposing of his crop.

I may here remark that my estimates, as here given, are based upon information that has been furnished me by several of the chief growers and distillers in the country, and I have endeavoured to verify them by various visits to the plantations and factories. Nevertheless, I would not disguise the fact that my calculation does not accord with the representations of three other writers on Paraguay; for Col. du Graty* sets down the yield, per hectare, at 400 to 600 *azumbres*, while Col. Wisner† and M. Schœrer‡ each reckon it at 250 *azumbres*.

In Tucuman, according to M. Schikendantz,§ a hectare produces 45 tons of cane, an amount which exceeds my estimate by 15 tons; but this does not influence my opinion. I am speaking only of the present state of things in Paraguay, without speculating on the future, and I should be quite ready to allow that a very favourable year and careful cultivation would raise the produce by 25 per cent.; yet this would be exceptional. The conclusion at which I have arrived, that the produce may be stated as being between 190 and 200 *azumbres* per hectare, is so satisfactory that there is no temptation to magnify it.

Comparing the cultivation of sugar-cane now with what it was in 1863, it is certain that it has diminished to the extent of 75 per cent.; then, according to the official report, there were 12,385 acres of cane, whereas now there are no more than 3,980 acres. Not only rum was exported at that time to the various towns along the La Plata, but also considerable quantities of preserves made of molasses.

In 1854 these exports included 6,800 cwts. of preserves, and 8,275 gallons of rum. After the war these exports were

* Graty, *La Republique du Paraguay*, p. 367.

† Wisner de Morgenstein, Amsterdam, 1871.

‡ S. Schœrer. *Revue du Paraguay*. No. 4, p. 7. 1888.

§ P. Latzina. *Geografia Argentina*, 1888, p. 448.

almost wholly discontinued, and in 1866 they only amounted to 264 cwt. of preserves and 601 gallons of rum.

Well nigh all the *caña* that is made is now required for home consumption. In the village of Yaguaron alone, 1,200 demi-johns (3,170 gallons) of white rum are drunk in the year, and three times that quantity in the immediate environs. In this way the consumption of rum in Paraguay may be measured almost exactly by the extent of the sugar-cane plantations. The total production thus amounts to 768,000 gallons; and after fair allowances have been made for cane that is eaten green, for the use of the undistilled syrup, for the making of preserves, and for the trifling export, there is the large residue of 748,770 gallons, which gives an annual average consumption of $1\frac{1}{2}$ gallon per head of the population.*

Raw *caña* is perfectly white, but with age it acquires the brown tint of ordinary rum, and it loses its original harshness. It grows into an excellent liqueur, and if it were better known it would successfully compete with Jamaica rum in the market. Its leading characteristic may be described by saying that it is a happy medium between rum and cognac, having the body of one, and the bouquet of the other.

Old *caña* sells at Asuncion for 70 cents a litre (13s. a gallon); but as the production fails to meet the demand, there is very little in the market, to the regret of the dealers, who, in their inability to supply the genuine preparation, have brought in a quantity of inferior spirit which they use for adulteration. The Asuncion Custom-house passed no less than 5,166 gallons of this in 1866, and in 1887, when the harvest of sugar-cane was bad, the quantity ran up to 24,137 gallons.

* How far this corresponds with the average consumption of spirits in European countries may be seen from the subjoined table:—

United Kingdom	1·3	gallons	(20° under proof)	a head.
France.....	1·8	"	"	"
Sweden	1·9	"	"	"
Germany.....	2·0	"	"	"
Prussia, Belgium	2·3	"	"	"
Denmark	4·3	"	"	"

France, in addition to this, consumes 22 gallons of wine a head.

The importation of gin, brandy, and all other kinds of alcoholic beverages, amounted, in 1886, to 33,000 gallons, and rose, in 1887, to 42,380 gallons.

It should not be overlooked that the Paraguay distillers, to a certain extent, are giving their attention to liqueurs. Wherever oranges grow, it is possible to make bitters; but the country here yields a variety of aromatic plants that can be utilized for a similar purpose. The yerba-maté, the guavira-mi, the various myrtaceæ, the guava, the pine-apple, the banana, the ipábo-y, and the cherimoyer, are all delicate fruits, of which any European distiller would gladly have the manipulation. The liqueurs they make are *recherchés*, and want only to be known to be appreciated.

COFFEE.—About coffee it only remains to be stated that its cultivation has only recently been introduced into Paraguay, and thus far with encouraging results. My friend M. Cafete, formerly Minister of Finance, has a fine plantation near Asuncion, and there are others in the environs of Limpio. The planters express themselves as quite satisfied with their undertakings, but their ventures are of too recent a date to warrant an estimate as to the profits they yield. All that I can say is that, to me, the aroma of the coffee appears very fine, and I am quite prepared to find that it can compete and hold its own in many a market.

In all essential respects the soil and climate of Paraguay are similar to those of the provinces of Brazil, where coffee is cultivated very extensively; and, consequently, an *à priori* conclusion may be drawn that the Paraguay coffee and the Brazilian would be equally good.*

* In 1889 the number of coffee trees was 23,966.

CHAPTER VI.

TOBACCO.

The best tobacco—The European smoker—Cultivation in Paraguay—Nicotine, and how minimized—Drying process—Reforms to be introduced—Cigar factories—Exhibition awards, 1889.

Smokers everywhere are ever on the look-out for the best tobacco, but very few of them are acquainted with the tobacco of Paraguay. Nowhere, except on the Rio de la Plata, is it duly appreciated, and yet its quality equals that of the finest Havana growths.

This lack of knowledge on the part of European smokers is largely owing to fiscal measures. There is, however, another cause, for, just at the period when the habit of tobacco smoking was becoming so universal, and all the different sorts were being put to the test, Paraguay was in the depths of its misfortunes, and hardly maintaining any intercourse with the outer world. Thus, whatever tobaccos it grew was consumed at home, and there was no chance for it to rival the growths that were being quoted on the European markets. And now that certain brands have become so popular, and are established as favourites with the public, it is no easy thing to find admittance for a new claimant. As matters stand, prices are now fixed, special varieties are classified, various blends are pre-arranged, and the very perfumes are made distinctive; hence it follows that the recognition of a new tobacco, however high its quality, would disarrange the whole system. For example, in France the ordinary 'scaferlati' is made up of 30 parts of Kentucky, 24 of Maryland and Ohio, and 12 of Levant. Its is so with all the named kinds. It is these regular blends that the manufacturers are accustomed to work up, and which the consumer asks for; and as neither maker nor smoker would care to depart from their ordinary routine,

there would be opposition raised at once to the introduction of a tobacco not previously in use. In countries, however, where the manufacture of tobacco is not a monopoly, these new varieties can readily be introduced by enterprising dealers or manufacturers.

In an open field Paraguay would occupy a foremost position, because its tobacco is of a quality that allows it to compete with the best. In the Paris Exhibition of 1855, the samples sent by Lopez were awarded a first-class medal, with the commendatory notice, "Very good collection of leaves, especially suitable for cigars."

In acknowledging some samples that had been sent him by Dr. Demersay, the Director of the French Government Tobacco Manufactures wrote: "The tobaccos of Paraguay are well adapted for manufacture, and I should anticipate a considerable advantage from introducing them into the Government factories, if, after they have been purchased in the country, their regular transmission to Europe could be always ensured."*

This difficulty about regularity of supply was raised at a time when communication with Europe was hardly thought of, and has little weight now. The voyage between Asuncion and Bordeaux is now accomplished by steam in 30 days, and this time will be reduced in a few years, when the projected railways shall have been complete.

At the Antwerp Exhibition of 1885, and more recently at the Barcelona Exhibition, the samples sent by several planters received special commendation from the jurors; whilst at the Paris Exhibition of 1889, they were selected for a *gold medal*, a token of appreciation that augurs well for the future.

As yet Paraguay needs no European market for its tobacco, for its produce hardly covers the requirements of home consumption and of Buenos Aires; but as the cultivation of tobacco is sure to increase in the immediate future, it is as well to draw, betimes, attention to its superior quality. Personally I should rejoice if the little Paraguayan cigars, which I have enjoyed so frequently, could be purchased in France.

* Demersay. *Du tabac au Paraguay*. Paris, 1851. P. 27.

I have already pointed out* the great similarity between the soils of Paraguay and Havana, and have given the analysis of the renowned red earth of Cuba which produces the *vuella abajo*, and of the earth which produces the growths of Villa Rica, Itaregua, Itaco-cue, and Oratorio-loma. When raised upon black earth, tobacco never has any aroma; but as in Paraguay it is always grown upon the red earth, there is the best security of its being of superior quality. Connoisseurs are unanimous in praising its delicate flavour. It is favourably mentioned by Dr. Renger,† M. Bonpland,‡ and M. Rogers.§ But what I consider the best of all testimony is the esteem in which it is held by the Argentine people, perhaps the greatest smokers in the world. Nowhere is choicer tobacco to be obtained than in Buenos Aires.

Of one thing, however, I feel sure, namely, that no justice has hitherto been done to the fine qualities of the tobacco by the growers and the few cigar-manufacturers at Asuncion. Everything in the way of preparation, which ought to be done with the most scrupulous care, such as the gathering and the drying of the leaves, is got through in the most primitive and careless manner, requiring decided improvement before exportation to Europe should be contemplated. Agricultural progress ought to secure this.

Before detailing the reforms which are necessary for a successful manipulation of tobacco, we may refer to the mode of culture hitherto followed.

Sown in May or June, in about two months the young seedlings are ready for transplanting; this is usually finished by September, although the operation sometimes goes on until December. The plants should be set about two or three feet apart, and in ten weeks' time will have reached their maturity, the growth being very rapid in Paraguay as compared with other countries, in which, according to M. Schloesing, the time ordinarily varies from 90 to 110 days.

* Vide p. 144.

† *Reise nach Paraguay Aarau*. 1835.

‡ Demersay, vol. II., p. 75.

§ *Notes sur la culture du tabac*. Asuncion, 1853.

The gathering is commenced with the lower leaves, which are very short; these form the quality known as *pito*. Within a few days after this, the blossom appears, and this is immediately pinched off, the plant being by this time over three feet in height. The upper leaves are gathered as they come to maturity, making the three sorts known in commerce as *media*, *regular*, and *buena*. Each plant produces about four leaves of these several grades.

In January, from the September plants, and in February, from the October plants, a fifth sort is gathered which is distinguished as *doble*; only five or six leaves are then left to be finally gathered in March or April, composing the quality known as *para*, which has a special repute of its own.

This method differs in several ways from what is practised in Cuba and elsewhere. In Cuba the leaves are allowed to grow until they are fully developed, and the entire plant is then cut down; a new growth will start from the roots, and in this way a second, and occasionally a third, crop is taken. The Paraguay system allows the leaf to attain maturity on the stem; the Cuban plan is to cut down the stem as soon as the leaf has ceased to grow.

The two ways of procedure result in the product of very different amounts of nicotine. If the law be recognized that the nicotine in the plant will increase with its growth from zero to 9 per cent., it would follow that, when gathered early, the leaves will contain but a small quantity of the alkaloid, and that the longer the gathering is deferred, the larger would be the proportion. Havana cigars accordingly exhibit from 1.8 to 2.2 per cent. of nicotine, whilst those of Paraguay contain it in increasing ratio, advancing from 2.5 per cent. in the *pito*, or first gathering, to 6 or even 7 per cent. in the *para*, finally picked. Of the intermediate qualities, the *bueno* has 4 per cent., the *doble* about 5 per cent., of nicotine.

Nicotine, as everyone knows, is the active principle of tobacco; it does not affect the aroma, although it may overpower it, if excessively abundant. To Americans, who are accustomed from their childhood to smoke the strongest of cigars, this element is a recommendation; consequently, it is

the *para* that commands the highest price at Buenos Aires, and there is good reason for growing it; but, in order to adapt the Paraguay growth for European consumption, there would have to be considerable modification introduced to the present style of cultivation, the fact being that very heavily-charged tobaccos find no market at all in the Old World. This may be illustrated by the annexed table, showing the amount of nicotine in the various brands of tobacco supplied by the French Government factories:—

Cigars, costing 5 to 7½ centimes (2 or 3 farthings)...	1·5 to 1·8 per cent.
Londrès and Havanas.....	1·8 to 2·2 ,,
Ordinary Scaferlati.....	2·2 to 2·5 ,,
Snuff	2·0 to 3·0 ,,

I am aware that, by soaking and repeated washings, it is quite practicable to reduce the nicotine so that the same gathering might be so manipulated as to suit the tastes both of Americans and Europeans; but as the aromatic elements are diminished as much as the others, the leaves after such treatment will have lost much of their proper flavour.

There is another method of reducing the proportion of nicotine which is in use in the Department of Lot. Instead of planting about 10,000 tobacco roots on a hectare, and letting them produce about eight leaves apiece, some 55,000 plants are placed very much closer together on the same area, and allowed to grow nearly a dozen leaves; it is found by this means that a milder tobacco is obtained, having a flavour that is everything to be desired.

Future colonists, then, will have to take into account that mild tobaccos in Paraguay are very scarce, although in every market except Buenos Aires they are the most saleable; so that, if they would aim at meeting the requirements of consumers throughout the world, they must make some very decided advance upon the existing method of production. The procuring of leaves with a lessened proportion of nicotine will be the secret of success in all cultivation of tobacco.

A table prepared by M. Schlösing, and here subjoined, shows the rate of increase of nicotine in the growing tobacco leaves for each fortnight, and is of use to the planter, as it

enables him to regulate his pickings according to the strength required.

Leaves of 1 month contain 79 per cent. of nicotine.

"	1½	"	"	1.21	"	"
"	2½	"	"	1.93	"	"
"	3	"	"	2.27	"	"
"	3½	"	"	3.86	"	"
"	4	"	"	4.32	"	"

These figures correspond with the estimates already given of the growth in Paraguay. These were made by M. Parodi, who reckoned that the *doble*, cut as it is when about 4½ months old, contains 5.3 per cent. of nicotine, and that the *para*, grown for 7 months, contains 7 per cent. The proportion coincides so nearly with M. Schloesing's conclusions that planters may safely follow his schedule.

Since the beginning of 1887, a Dutchman, M. Batz, who had grown a good deal of tobacco in Java, has had a plantation at Lambaré, near Asuncion, where he has raised some exceptionally fine plants upon a *rosada*, which, as has been explained, is only half-cleared land. He regards what he is doing as an experiment, but colonists will be able to learn something from the success he seems likely to achieve.

An additional reason why Paraguay tobacco is liable to be depreciated is found in the hap-hazard way in which it is allowed to dry, and so to lose much of its virtue. The growers in the country, having gathered the leaves, are accustomed to let them dry in the open air, paying no attention to heat, or damp, or any inclemencies of weather. Deterioration must inevitably follow. The process of drying ought to be slow, never taking less than six weeks; it should be done under cover, in sheds with apertures that can be opened or closed as requisite; it is an operation that wants considerable care, as it is important that the leaves should lose their moisture quite gradually. In Paraguay, the sheds should be left open during the damp northerly winds, and they should be kept shut up when dry winds prevail, in which case the evaporation is liable to be so rapid as to carry off an undue proportion of the aromatic and saline constituents, and to leave the tobacco flavourless and insipid.

Another item of which account has to be taken in the manipulation of tobacco is its combustibility. This is a property which it is not always easy to obtain, and in which Paraguay tobacco is apt to be deficient. It is dependent upon the amount of potash in the soil, and upon the form in which it is taken up by the plant. To burn properly, the leaf must have assimilated potash in organic salts, such as malates, citrates, oxalates, and tartrates. Unless these conditions are fulfilled, combustion will not go on, and it is because the conditions have failed that many countries have produced tobacco that is of no practical use. Paraguay is not singular in this respect, and if sometimes its tobacco is faulty in its burning properties, the defect has arisen from the plants being grown either where potash has never existed, or has been exhausted by repeated sowings of the same crop.

A tobacco-planter should never omit returning to the ground the proportion of potash which the year's vegetation has absorbed. It is a substance in which no plantation in Paraguay need be deficient, indeed few countries abound more in saline elements. Saltpetre (nitrate of potash) is abundant, and as it is the most accessible, so it is the cheapest of all manures that a planter can use; mixed with carbonate and sulphate of potash, it is one of the best compositions known for stimulating the production of organic acid in the plant. The reason that it is not universally employed is that it is generally dear, and consequently sulphates, as being less expensive, are made to suffice; but in Paraguay it is always close at hand, and it would be by no means an unprofitable speculation to open depôts for supplying it to agriculturists.

In reply to the inquiry how much tobacco has been and is being grown in Paraguay, it may be stated that, according to M. Bonpland (who bases his estimate upon a survey of the districts in which the plantations were found), the total production in 1829 was 106,900 arrobas, *i.e.*, about 2,709,000 lbs. M. Demersay considers that this computation is too low, stating that in that year the export from the town of Itapua alone amounted to 45,000 arrobas (1,140,000 lbs.), and maintains that such were the habits of the country that the average

consumption could not be reckoned at less than 13 lbs. a head per annum ; so that if the population at that date were what it is supposed to have been, it would have to be concluded that the whole amount was not much under 4,437,000 lbs.

From his own personal investigation, M. Demersay arrived at the conclusion that, in 1851, the production was 450,000 arrobas (11,400,000 lbs.).*

Du Graty considers that in 1860 the growth had reached 16,500,000 lbs., the average annual consumption having advanced to $27\frac{1}{2}$ lbs. per head.†

Passing, however, from speculative estimates to ascertained facts, we arrive at the following results.

A *liña*‡ of land, that is, about 78 yards, produces on an average an arroba (something over 25 lbs.) of tobacco. In 1863,§ 853,978 *liñas* were under cultivation; in all, over 13,000 acres ; so that the total production was more than 21,600,000 lbs. As the export was only 3,434,000 lbs., it appears that the home consumption was over 18,000,000 lbs., or an average of more than $22\frac{1}{2}$ lbs. for each inhabitant. Although somewhat lower, this does not differ very materially from Du Graty's estimate.

Coming to the present time we find that, in the face of the enormous decrease of population, the tobacco plantations in 1889 extended to 912,918 *liñas*, and consequently are producing 23,127,000 lbs., an amount in excess of what it was when the country was in the time of its prosperity, and had 800,000 inhabitants.

The export in a year being now nearly ten millions of lbs., the local consumption is more than thirteen million lbs., giving an average of not less than 22 lbs. a head. What an enormous amount this is will be realized when it is taken into account

* Demersay, *Du tabac au Paraguay*, p. 25.

† Du Graty, *Histoire du Paraguay*, p. 164.

‡ A *liña* is equal in length to a *cuerda*, and is not to be confounded, as it is by some writers, with a *cuadra*. The former is 83 *varas* (235 feet), the latter is 100 *varas* (284 feet).

§ Jacquet, *Annuaire Statistique*, 1886, p. 108.

that the average annual consumption for France is no more than 1 to 10 ozs. a head.*

If 114 cigars are supposed to be manufactured out of each pound of tobacco, we find that everyone in Paraguay smokes seven cigars a day. This is interesting, and not to be overlooked.

In 1887, the export of tobacco was only 349,003 arrobas, a decrease of 67,003 arrobas, as compared with 1886; but it must be set against this decrease, that 776,000 manufactured cigars were sent out also.

According to the statistics of the Argentine Republic, the largest of all the consignments received at Buenos Aires were those from Paraguay. At Buenos Aires, on March 17th, 1888, the prices of the various qualities of tobacco ranged from 1\$ 90c. the arroba of 25 lbs., to 3\$ 80c., being at the rate of 1\$ 90c. for *pito*, 2\$ 20c. for *media*, 2\$ 40c. for *regular*, 2\$ 75c. for *buena*, 3\$ 30c. for *doble*, and 3\$ 80c. for *para*. The average market price was thus 3s. 10d. a pound. It should be remembered that these quotations are inclusive of the following charges, viz.:—1st, an export duty of 20 cents. per arroba, levied by Paraguay; 2nd, a freightage of 8\$ a ton; and 3rd, an import duty levied at Buenos Aires.

In Paris the average price paid for tobacco by the government factory amounts to 1s. per pound. Maryland, of the commonest sort, costs 4·3d.; fine Java, 2s. 9d.; Brazilian is quoted from 7·7d. to 1s. 2d. As a matter of course, I leave out of the question such exceptional growths as the Havana brands, which will realize the fancy price of 10s. a lb.; but it will be seen from the foregoing figures how wide is the scope that is offered for the profitable sale of the Paraguay leaf.

At present, in the small local markets, tobacco, at the current price of about 3d. a lb., ought to bring in nearly £21 as the produce of every acre planted with tobacco. With a very small improvement in his modes of growing, gathering, and

*The latest published statistics show that the French department in which there is most smoking is that of the Nord, where the average is nearly five pounds; that in which the smoking is least is Cantal, with an average of a trifle over a pound.

drying, the planter might be certain to increase his profits by 30 or 40 per cent. ; and the Government, moreover, is giving a considerable encouragement to the culture by allowing the exportation of all well prepared tobaccos duty-free.

Once let it be demonstrated that tobaccos of fine quality can be produced in the country, and it is manifest that the importance of the cultivation cannot be too strongly insisted on.

The immense demand for Havana tobacco has tempted the growers to make quantity their chief aim. This has been carried out at the expense of the quality, which is deteriorating from its high standard. If Paraguay could take advantage of the circumstances, and contribute an adequate supply of first-class leaves, well manipulated, and not overcharged with nicotine, there is no room to doubt that the production would soon find a place in the European markets, where the complaints are growing that unadulterated tobacco is hard to get. It is needless to add that a large organization with ample capital would be the likeliest to ensure the success of such an enterprise.

Apart from their business in raw tobacco, some of the dealers have begun to manufacture cigars for exportation, Villa Rica being the chief centre for the trade. Several varieties have been made, corresponding to the sorts in ordinary demand, and, being packed in the familiar cedar-boxes, are not to be distinguished in appearance from other growths; in flavour, as I know from experience, they can meet the taste of the most fastidious. An inferior kind of cigar is likewise being manufactured, but even this is better than what are commonly sold in Paris for 3d. a piece.

In Paraguay there is now no importation of tobacco to be taken account of ; with the exception of the few parcels of the better sort of scaferlati that are sent from France for the use of the settlers, it is practically nil.

CHAPTER VII.

TIMBER.

Industrial value—M. Plaisant's report—M. Rosetti—Qualities of the timber—Exportation.

The excellence of the timber grown in the forests of Paraguay is notorious throughout South America.

Having already, in the first part of this work, presented the reader with a general notice of the flora of Paraguay, there remains to be considered the commercial value of the various timber trees.

This subject has, on various occasions, been brought before the European public. The specimens of woods brought home by M. Demersay and Colonel Du Graty, were submitted to scientific tests in France or in Belgium. M. Plaisant, of the School of Arts and Sciences at Aix, published a report upon the red *morosimo*, the *palo amorillo*, and the *palo de rosa*. More recently, researches that have been made in the Argentine Republic, both in Corrientes and the Misiones, where the vegetation corresponds in great degree with that of Paraguay, have brought to bear additional light upon the subject; and books have been written to specify the various ways in which the wood is available for building purposes, or for making furniture, as well as its different uses for tanning and chemical purposes. These, however, are for the most part very limited in the range they cover, and leave a great area still to be explored.

Amongst these publications I may specially refer to the interesting report made by M. Rosetti, the engineer, on the natural properties of the Argentine woods.* Much of what he says refers to the timber of the Misiones, but is equally applicable to Paraguay. After giving the dimensions of the

* Emilio Rosetti. *Propiedades Físicas de las Maderas de la Republica Argentina*. (*Anales de la Sociedad Científica Argentina*, 1880, p. 227).

trees, he divides the woods into three classes: 1, for building; 2, for carpentering; 3, for cabinet-making. He then tabulates their specific gravities, their powers of resistance, their working qualities, their durability, and their grain.

This elaborate report of M. Rosetti appears to establish some very interesting facts.*

It will be observed that the tensile strength of the woods is in most cases superior to that of our European timber. The tensile strength in the case of the European oak, for instance, only amounting to 8,380 to 19,990 pounds per square inch, and that of the pine to 8,380 to 13,190 pounds.

Equally favourable is the position of Paraguayan timber with reference to the crushing weight which it can bear.

The density of all the woods is as a rule very great, and there are not many of them that will float. Out of 36 kinds of timber that are enumerated, the density of ten is greater than that of water, while fourteen approximate to it within 3-10ths. In making the comparison with European timber, allowance must always be made for the variations that are found even in the same species; the very strongest oak has a density not exceeding 0.993, while the oak of Danzig is not more than 0.872. And as the density is almost in direct ratio with the resistance and durability, a high opinion must necessarily be formed of the sterling qualities of Paraguay timber.

Nor is the country deficient in lighter woods, such as are in demand for carpenters' work. Many of these are of great strength, and yet they have a density very much lower than pine.

An examination of the tables will likewise demonstrate the superior strength and stiffness of the *cedrelaceæ*. The *taperiba*, which M. Rosetti has now described, is quite equal in strength to the *lapacho*, as was proved by trials made in Paris.

There is no need to say more of the excellent qualities of the timber which grows in Paraguay. Ampler details than those given above will be found in the books of Rosetti, Parodi, Du Graty, and Martin de Moussy.

* For Tables based upon the facts given by M. Rosetti, see end of this chapter.

Wheelwrights find in the woods of Paraguay all they are likely to require. The *ibyraro* may be especially mentioned as being in constant request for the spokes and fellys of wheels. The *tala* (*Celtis* sp.) is also, I believe, to be much recommended for its extreme flexibility, and if it were better known it could hardly fail to be in large demand for bent-wood furniture; as, after it has been curved to the desired form, it wants only to be exposed to a very moderate heat to make it retain its new shape.

For ship-building, the *petereby* would be useful, as it is well suited for masts and yards; so, likewise, would be the *tatane*, of which Lopez constructed all the framework and the curved ribs of his vessels; and, no doubt, the *ibyraro* and the *algar-robo* might be utilized for a like purpose. I may further mention that the *timbo* would make excellent light boats, and that the Indians use it for their canoes.

So rich are the forests in trees, of which the wood is not only fine-grained, but diversified in its veining and attractive by its colour, that cabinet-making has a fine field open before it. The various kinds of *cedrelæ* are mostly in demand, on account of their comparative cheapness, and the facility with which they are worked. In Europe they are known in the timber trade as female mahogany; but the lack of means for transport has hitherto prevented them from being exported on a large scale.

But most profitable of all should be the kinds of which the grain is very fine, and the veins most delicate. Among these must be included the *palo santo* (gaiac), *palo de lanza* (rosewood), and *mazaré*. The black laurel has all the appearance of ebony, and is more easily polished. The *tatayba*, which has a bright yellow colour, is peculiarly well adapted for joiners' work; and there are many palms, including the *caranda*, which would certainly be much sought for, if only their texture were properly known. And, lastly, there is the *yacaranda* (*dalbergia nigra*), which resembles rosewood.

It would hardly be right to conclude this brief summary of the timber-growths of Paraguay without a reference to those magnificent varieties of *citrus* (both oranges and lemons), of

which the stems, century-old, are waiting to yield their contribution to art-industry.

Thirty years ago, the difficulties of transport, the isolated condition of the country, and the harassing opposition of a jealous Government, were all so many obstacles to the foreign trade of Paraguay. Things are now much modified ; and I should hope that what I have written upon the improved means of communication, may tend to quiet any misgivings about the future conveyance of produce to Europe. Let the projected railways be opened, and the trade in timber will be sure to assume its proper importance, and the Old World will have the opportunity of utilizing the treasures of the New World, which have hitherto been beyond its reach.

The subjoined table, as given by the Statistical Office, shows the export of timber from Paraguay for the seven years after 1880 :—

	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Logs of hardwood, varas (value 4s. a vara)	33,424	20,232	31,785	64,412	41,278	73,901	67,445
Palm-tree logs, number ..	5,180	1,513	750	12,990	5,625	4,175	12,126
Cedar planks, number ..	10,047	13,538	55,786	160,731	163,955	131,860	125,971

No timber is imported ; but during 1890, furniture, valued at \$21,907, chiefly from Germany, was brought into the country ; but as this is only the custom-house valuation, it was really worth considerably more. Hence an idea may be formed of the business that might be done if a factory for furniture were started at Asuncion to meet the local demand. A certain amount of success has attended the opening of a small establishment, but it requires command of much larger capital to develop fully the capabilities of the trade.

We may refer here to the fact that the cars for the Villa Morra tramway are no longer obtained in Europe, but are being built, since 1888, at Asuncion.*

* This tramway, ten miles in length, is the property of Mr. Ogilvie. In 1890 it carried 840,904 passengers, besides season ticket-holders.

STRENGTH OF PARAGUAYAN WOODS.

Co-efficients of Resistance to Rupture in Pounds to the Square Inch.

WOODS.	Tensile Strength.	Crushing Weight.	Transverse Strength, or Stiffness.
Curupay (<i>Piptadenia communis</i>)	23,320 to 16,190	14,360	24,300 to 16,470
Quebracho colorado (<i>Loxopterygium Lorenzii</i>)	20,910 to 13,110	21,900 to 12,810	24,630 to 17,070
Tatane blanco (<i>Acacia maleolus</i>)	19,910 to 14,230	18,510 to 10,840	16,230 to 12,670
Palo santo (<i>Guayacum officinalis</i>)	19,580 to 15,300	10,850	20,010 to 12,670
Orange-tree (<i>Citrus</i>)	19,260	6,940	16,870
Lapacho cresco, tayi-pichay (<i>Tecoma curialis</i>)	18,000 to 14,230	13,180	23,610 to 15,120
Nandubay, aroma or espinillo (<i>Acacia cavenia</i>)	18,000 to 13,510	9,000	17,560 to 13,570
Urunday (<i>Astronium fraxinifolium</i>)	16,920 to 16,640	16,140 to 11,840	16,850 to 13,230
Urunday-para (<i>Astronium</i> sp.)	—	—	10,550
Quebracho blanco (<i>Aspidosperma quebracho</i>)	10,100 to 7,250	7,680	10,180 to 4,640
Candela	9,190 to 8,580	8,890	17,490 to 14,110
Palm, yellow	—	—	20,990 to 15,030
Do, black	—	—	14,220 to 9,770
Incienso (Incense-tree)	—	—	19,770 to 17,070
Caranday (<i>Copernicia cerifera</i>)	—	—	22,060 to 18,880
Ivira-pyta (<i>Caesalpinim</i>)	—	—	18,010 to 16,570
Curupicay	—	—	18,220
Lanza blanco	—	—	14,330 to 12,460
Aguay-mini	—	—	17,590 to 14,380
Blanco grande	—	—	10,270 to 8,110
Palo de rosa (<i>Machaerium</i> sp., rosewood)	—	—	13,920 to 9,510
Pacara (<i>Enterolobium</i> sp.)	—	—	11,820 to 10,540
Timbo (<i>Enterolobium timbowa</i>)	—	—	9,560 to 9,270
Petereby (<i>Cordia excelsia</i>)	—	—	6,710
Black Laurel (<i>Emmontum apogon</i>)	—	—	9,900
European oak	20,000 to 8,400	9,700 to 5,800	6,500
Pine	13,190 to 8,400	8,400 to 5,800	5,700 to 7,000

SPECIFIC GRAVITY OF PARAGUAYAN WOODS.

Wood.	Family.	Specific Gravity.
Quebracho colorado (<i>Lexopterium Lorentzii</i>).....	Terebinthaceae	1.392 to 1.232
Palo santo (<i>Guayacum officinalis</i>)	Rutaceae	1.303 to 0.918
Caranday (<i>Copernicia cerifera</i>)	Palmas	1.207
Nandubay (<i>Acacia cavenia</i>).....	Leguminosae...	1.211 to 1.090
Curupay (<i>Acacia astringens</i>)	Do.	1.172 to 0.917
Urunday (<i>Astronium fraxinifolium</i>)	Terebinthaceae	1.091 to 0.920
Lapacho, tecoma-ipe (<i>Tecoma flavescens</i>)	Bignoniaceae...	1.072 to 0.952
Ibira-pyta (<i>Caesalpinium</i>)	Leguminosae...	1.038 to 0.744
Quebracho blanco (<i>Aspidosperma quebracho</i>).....	Apocynae ...	1.030 to 0.810
Palo blanco (<i>Exostemma</i>).....	Rubiaceae	1.027 to 0.918
Tatane (<i>Acacia maleolus</i> , <i>phitecolobium</i> , <i>tatane</i>)	Leguminosae...	0.978 to 0.650
Guayaiba (<i>Patagonula Americana</i>)	Borragineae ...	0.907
Morosimo	Leguminosae...	0.905
Palo amarillo, Say-yu	—	0.886 to 0.544
Ibyraró (<i>Ruprechtia excelsia</i>).....	Polygonaceae	0.875 to 0.765
Yba-hehe (<i>Acanthosyris spineicens</i>)	Santalaceae ...	0.832
Black laurel.....	Laurinaceae ...	0.826 to 0.693
Petereby (<i>Cordia excelsia</i>)	Asperifoliaceae	0.810 to 0.619
Algarrobo blanco (<i>Prosopis dulcis</i>)	Leguminosae...	0.809
Nandipa (<i>Genipa Americana</i>).....	Rubiaceae	0.780 to 0.746
Palo de lanza, lance-wood, Ibyraró Haro (<i>Ruprechtia excelsia</i>).....	Polygonaceae	0.780
Algarrobo negro, Ibope (<i>Prosopis dulcis</i>)	Leguminosae...	0.730 to 0.646
Palo de rosa, rose-wood (<i>macheriaeaum</i> sp.)	—	0.730 to 0.634
Tatay-iba (<i>Broussonetia tinctoria</i>).....	Urticeae	0.720
Tala, Yuaci-y (<i>Celtis Sellowiana</i> , <i>C. flexuosa</i> , <i>C. cerciata</i>)	Do.	0.696 to 0.608
Curi-y, white pine (<i>Araucaria Brasilensis</i>)	Coniferae	0.585
Red pine	Do.	0.571 to 0.410
Chaníar (<i>Gorliaea decorticans</i>)	—	0.568
Veined cedar (<i>Cedrela Brasilensis</i>)	Cedrelaceae ...	0.540
Tarepaba-guazu (<i>Persea</i>).....	Laurineae	0.500
Caa, maté (<i>Ilex Paraguariensis</i>)	Aquifoliaceae	0.490
Pacara (<i>Enterolobium</i>)	Leguminosae...	0.473 to 0.344
Tacara (<i>Bambusa</i>)	Gramineae.....	0.468
Timbo, cambaíambi (<i>Enterolobium timbowa</i>)	Leguminosae...	0.440 to 0.328

CHAPTER VIII.

TEXTILE PLANTS.

Abundance—Cotton and ramie—Ibyra—Its future—Guembepi ropes—Their use in travelling—Possible use for navy—The silk tree.

THE forests of Paraguay abound in textile plants, many of which are capable of being utilized for industrial purposes, and as they have been long known to the inhabitants, a good deal of practical information can be obtained about them. Since the introduction of European fabrics, there has been much less weaving than formerly. The people have found it much more convenient to buy their goods ready-made than, with their meagre appliances, to manufacture for themselves. This has had the effect of letting certain of the qualities of the textile plants be forgotten, and even the names of some of those mentioned by writers of former times have faded away from the memory of the present inhabitants. It would be tedious to enter here into any minute description of the various fibrous plants that are found in the forests, especially as, for the present at least, some of them could not be turned to any good account. Notice of nearly all of them can be found in the catalogues of different exhibitions, and in botanical works that treat of the Paraguayan flora.

My book, being essentially intended for practical men, I shall confine myself to a consideration of those textile plants which are even now available for industrial purposes. These are cotton, ibyra, ramie, caraguata, guembepi, mbocaya, yatahi, samuhu, and caaporopy.

COTTON.—Three kinds of cotton are grown in Paraguay—the *gossypium herbaceum*, the *gossypium vitifolium*, and the *gossypium arboreum*. There is another variety called in Guarani *mandypyta* (red cotton), which yields a fibre that is woven into the pretty brown *ponchos* that are still worn by some of the natives of the country.

All these varieties are known in Guarani by the general

name of *Mandyl*. The fibre of them all is white, more or less pure; the longest of them being that of the *gossypium herbaceum*. No higher testimony need be sought for it beyond what was given in its favour, in 1860, to Col. du Graty by some of the leading merchants in Antwerp, who said that "Paraguay cotton is an excellent product, being both long and fine, and similar in quality to the best Brazilian sorts."*

I need not enlarge upon the important part which cotton may play in an agricultural colony. At present its cultivation in Paraguay is reduced to a minimum, the official statements for 1889 showing only 12 acres planted with it as compared with 23,300 acres in 1863; the enormous difference is of course to be readily explained by the different circumstances of the country, which at the earlier date had to provide the cotton fabrics for its own requirements, and which are now met by the importation of foreign manufactures, the land being for the most part devoted to the production of food.

Cotton-growing, consequently, appears to promise satisfactory results. The quality that can be grown is of such superior character as to ensure an increasing demand. The fields of Paraguay are waiting for the enterprise.

RAMIE.—This great nettle grows wild in Paraguay, sometimes attaining a height of four or five feet in the damp soil of the virgin forest. Two varieties are found in the vicinity of the rivers, viz., *urtica utilis* and *urtica nivea*. M. Artecona of Asuncion, who has made experiments upon this native plant, has found that, without any cultivation at all, eight gatherings may be made in the course of one year. Such a number may appear excessive, and it is more than likely it could never be maintained in the open country outside the forests; the warm moist atmosphere of the underwood in South America is very different to the air of the *campo*: but even allowing, as M. Valenson of Las Toscas maintains, that four gatherings a year could be got in, this would be a yield greater than what is obtained in any other country. As the cultivation of this valuable *urtica* has only been tried to a

* Du Graty, *Hist. Par.*, p. 375.

limited extent, I could not undertake to say what would be the average yield; but I know that Count de Malartie, who has imported it into France, has been accustomed to grow about 5,000 plants to an acre, and that he considers a plantation once formed will last more than 20 years, a few days' weeding at a time being all the labour that is wanted. The French Industrial Society buys it at the rate of 6d. per lb., a price that speaks for itself as to the profit that should accrue from its cultivation.

IBYRA and CARAGUATA.—Growing wild, and in a profusion that would ensure an unbounded supply for a long time without any cultivation at all, these two members of the family of the Bromeliaceæ are well worth the attention of anyone who might settle near Asuncion. They are both of a kindred species to the pine-apple, bearing a wild fruit that has a flavour which is by no means disagreeable. Of the two, the ibyra is the more valuable; its flexible leaves grow in clusters, and are often 12 feet in length. There are two varieties; one with a white edge, growing on the skirts of the forests; the other of a reddish hue, to be found in the forest itself. In some parts of the country the ground may be said to be literally covered with ibyra, especially around Arroyos y Esteros and Caraguata; in fact, the latter town has derived its name from the Bromeliaceæ in its neighbourhood. One man, with a *machete*, can cut several loads a day; and the plants grow up again in six months, so that two gatherings may be made every year from the same spot. The fibre runs along the entire length of the leaf, and is altogether a unique product; it does not rot, and has an unexampled power of resistance. M. Vetilar, who has written a learned work on textile plants, makes particular mention of the *bromelia* as eminent for strength, fineness, and durability; and, having myself handled some hanks of it that had been prepared in Paris, I can give my opinion that it has a silkiness beyond what is found in *ramie*.

M. Artecona, being much impressed with the value of the ibyra, has made some attempts towards adapting it to weaving

purposes at his factory near Arroyos y Esteros ; he succeeded in decorticating the plant in its green state by means of cylindrical rollers ; but, owing to inadequate machinery, he failed to get the peeling done satisfactorily ; consequently, he has temporarily abandoned the project of preparing skeins for weaving, and has contented himself with the simpler operation of making them fit for paper-making. The paper that is produced from this material is at once strong and supple, and of a quality superior to that which is usually employed for bank-notes.

After lying for six hours in a vessel exposed to the action of hot steam, all the pulpy part disappears from the leaf, leaving only a thin pellicle, inside which the fibres are left, in their natural position, separate and distinct. Before the fibre could be rendered fit for weaving, this pellicle would have to be removed, but for paper it presents no difficulty. For a time then, it may be well to confine the manipulation of *ibyra* to the less costly and laborious process, which, including gathering and packing, can all be got over in three days.

What I have said will tend to call attention to the subject ; but in a few years I should believe that *ibyra* will be one of the sources of wealth for Paraguay. Very much the same may be said with respect to *caraguata*, except that, the fibre being coarser, it is better adapted for ropes and twine, in which there need never fail to be a lucrative trade.

In 1887 about 50 tons of rope and string were brought into Asuncion. Nothing could be more unreasonable than that there should be an import of such a kind into a country where textile materials are so exceptionally abundant. Unquestionably there must be a fine opportunity for an energetic manufacturer to start a business in this line, if it were only to meet the local demand.

PALMS.—The two kinds of palms that supply the most serviceable material for spinning are the *mbocaya* and the *yatahy*. The former (*Cocos sclerocarpa*) has leaves of a considerable length, containing a fine strong fibre that in some respects resembles the *caraguata*. It is very easily peeled,

and all over the country a great variety of uses is found for it. The Indians apply it to many domestic purposes; they likewise make it into nets which are capable of any amount of wear, and I have seen fabrics woven out of it that are very soft in texture, and take an excellent dye.

Yatahy cannot be said to be so generally useful. It is used for making string, and for hats and fans; but it is a plant that has its own special value on account of a farinaceous pith that is extracted from the stem, and a spirit that is made from the fermented fruit.

SAMUHÙ.—This is the plant that produces what is known as “vegetable silk.” It is closely allied to the cotton-tree, inasmuch as the bombacæ, to which it belongs, and the gossypium, are both genera of the malvacæ tribe. As the down is very short, it has not the industrial value of cotton, but it has a lustre and flexibility which make it very similar to floss-silk. I saw a *poncho* that was sent to the Paris Exhibition of 1889, and I am sure that its softness and silken sheen could not fail to be admired, if only it once attracted the notice of the fashionable world.

There are several varieties of *Samuhù* belonging to different genera of the malvacæ. One of these is known in the Argentine Republic as *palo barracho*; it has a straggling growth by which it can be distinguished at a great distance along the river-banks, and from which it derives its Brazilian name of *barrigudo* and its botanical definition of *bombax ventricosa*. I found one variety in the Ygatimi valley of which the unripe fruit was remarkable for the great diversity of colours it presented. The trunk, which is straight and perfectly cylindrical, is sometimes 70 feet high, and is covered with long thorns. The Indians do not utilize the down; they use only the strong fibrous substance that is found underneath the bark. Out of the trunk itself they make their light canoes.* M. Luigi Balzan has described five species of *Samuhù*; but I am not aware that he mentions a kind which I met with on the Jeju

* *Revue de Paraguay*, 1888, No. 5, p. 16.

and Upper Parana; it is a creeper, growing to a great height and known among the natives as *ysipo-samuhù*.

In Matto Grosso the down is much in request for stuffing pillows and cushions.

GUEMBEPI.—Belonging to the Aroideæ family (*polhos pinnatifida*), this creeper in certain districts is known as *mbeguepi*. It is most frequently found hanging down from the tops of the tallest trees in the forest, and its roots, before reaching the ground, form the inextricable tangles that are the most picturesque feature of the "*montes virgenes*." The filaments that are taken from the bark are of a length and durability that are quite unrivalled; they are so black that all the ropes into which they are twisted have a marked character of their own. It was because they can be kept so long in water without rotting that Lopez used them so much for his ships. My own experience has shewn me that in heavy work, where hemp ropes have given way, those made of *guembepi* have often been able to bear the strain. Those who are responsible in any way for the administration of naval affairs, might do well to give their attention to a material that seems destined to be of such importance in the rope-making industry.

CAAPOROPY.—This, which is another of the urticææ family, produces a thread which may be woven like flax. It grows near inhabited places in the same way as the common nettle, and with comparatively little outlay might be made a source of profit.

It only remains for me to mention the names of a number of other plants from which textile material can be obtained.

There are the banana, the pino-guazu or great wild nettle, the pyta or American aloe, the cururu-iby, the chaguara, the guembe, the igan, the icipo curuzu-y caatpeba, the mbocaya-saite, the payagua rembiù, the yuacarinina, the yatai, and the caa-pigui.

To enter into details about these would only be a wearisome task, and I need do no more than refer those who are interested in such plants to the catalogue of the exhibits at Paris in 1889.

CHAPTER IX.

VARIOUS RAW MATERIALS.

Colours and dye-stuffs—Indigo and Urucu—Oil plants: ground-nuts, palms, and castor-oil—Medicinal plants: coca, jaborandi, ipeca, and papaina.

DYE STUFFS.—Colour manufacture, both for painting and dyeing, has every likelihood of making its way in the markets of Asuncion. The mineral as well as the vegetable kingdom produces a variety of colouring materials, some of which are already known, and would have an immediate sale; whilst others, as yet, have a reputation to acquire beyond the locality in which they are found.

Amongst minerals I will only mention ochre and manganese. Both these would be sure to sell in all American markets, as the present supply is entirely furnished from Europe, and the Paraguay manganese is of a specially fine quality. According to the analysis of M. Van Bastalaer, its component parts exhibit the subjoined proportion:—

Peroxide of manganese	8·677
Acerdese.....	0·344
Hydrated peroxide of iron.....	0·159
Clay	0·808
Waste.....	0·012
Large traces of barytes	—
	<hr/> 10·000 <hr/>

If, at some future time, the promising beds of porcelain clay are properly worked, as well as those of fuller's earth that I have seen in Paraguay, there will be quite enough manganese and iron to decorate all the pottery that can be made; and as I have found copper ore in the Sierra Mbaracayu, I feel sure that salts of copper will not be wanting.

But it is in the vegetable kingdom that Nature has been most lavish in the supply of dyeing substances. Generation after generation, from the most primitive times, the know-

ledge of the properties of certain plants has been handed on; from the native Indians it passed to their conquerors; but the secret of the preparation has been profoundly kept, so that it has never yet been divulged to the Old World, where, however, since the discovery of the aniline dyes, it could not be turned to such good account as formerly it might have been.

Yet, in spite of the progress that has been made of late years in the manufacture of colours, and notwithstanding the large variety of novel tints that have been introduced to the public, it is interesting to know what are the raw materials still existing in the new continent. It may be that new settlers will bring unexpected substances to light.

At the Paris Exhibition, in 1855, the Government of Paraguay, having sent samples of 14 dyes, received a first-class medal; and again, in 1889, it was awarded a gold medal as the result of competition in the same class.

And here I may insert a list of 26 of the plants that are utilized in the country in connection with the dyeing trade:—

BLACK; 8 plants, namely:—

1. *Arachi-chu* (*Solanum nigrum*), nightshade.
2. *Coca* (*Erythroxyton tortuosum*); this must not be confounded with *E. Coca*, though it also contains a certain quantity of cocaine.
3. *Timbo* (*Enterolobium timbowa*); it is the fruit of this which yields a jet-black tint.
4. *Ibopé*, or *Algarrobo* (*Prosopis dulcis*); the bark of this, which is very full of tannic matter, produces, when mixed with salts of iron, a fine black dye, which does not injure the tissue of fabrics submitted to it.
5. *Mureci* (*Byrsonima verbascifolia*); the colouring matter of this and the three following kinds is extracted from the bark.
6. *Mechoacan* (*Convolvulus giganteus*).
7. *Urundey-mi* (*Astronium urundeiba*).
8. *Tubicha moroti* (*Cassia occidentalis*).

VIOLET; 1 plant, viz.:—

9. *Yuqueri pehy*. From this plant either a violet or

yellow dye may be obtained, according to the chemical base that is used as mordant.

INDIGO ; 2 plants, viz. :—

10. *Caa-hoby* (*Indigofera tinctoria*). This is the true indigo, the extract of which is as fine as any in the market. All that has ever been sent to Europe has been bought up at a good price ; but hitherto the manipulation has only been carried on in the most primitive fashion by the Indians and half-breeds.
11. *Urubu retyma* (*Eupatorium indigofera*). This plant, having the brilliancy of the true indigo, is often used to adulterate it.

BLUE ; 3 plants, viz. :—

12. *Caa-chira* (*Oldenlandia carimbosa*) ; a very small plant, with a quadrangular stem, which produces a bright-blue dye. According to Parodi, the same name is often given to one of the *indigoferæ*.
13. *Nandy-pa* (*Genipa americana*) ; the fruit of which yields a most effective blue dye.
14. *Caa-hu-guazu* (*Solanum verbacifolium*). This is used in two different ways ; it is soaked in urine to produce a blue dye, so dark as to be almost black ; or it is mixed with indigo to hasten fermentation.

GREEN ; 1 plant, viz. :—

15. *Caa-hoby* (*Cessus tinctoria*). The green dye extracted from this is not very durable, and is liable in course of time to change into blue.

YELLOW ; 5 plants, viz. :—

16. *Chilea* (*Baccharis calliprinos*). The blossom yields a tint of bright ochre.
17. *Isypo-yu*,—of the family of the Escitamineæ. According to Parodi, this plant contains curcumine.
18. *Mbuy-Ibotey-Sainba*. The colouring matter in this is slightly resinous.
19. *Caa-pa* (*Maclura Xanthoxyrum*).
20. *Tata-y-iba* (*Broussonetia tinctoria*).

RED ; 6 plants, viz. :—

21. *Taiy-Pichoy* (*Lapacho cresso*). The colouring mat-

- ter of this, which is originally yellow, when treated with alkalis, becomes first orange, then a bright red.
22. *Caa-Tigua* (*Trychilia catigua*).
 23. *Caa-acy* (*Malpighia rosea*). The dye is a pale rose.
 24. *Caa-canga* (*Gallicum cangay*). This is very abundant in Paraguay; this root produces a very brilliant red, little inferior to madder. Du Graty says that the country people mix it with cochineal.
 25. *Urucu* (*Bixa orellana*). Of the various tinctorial plants of South America, this is one of the most common; it gives the bright vermillion with which the Indians paint their bodies. The quantity of tannin it contains makes it a good dye; its properties are slightly astringent, but the quantity that has to be used is so minute that no ill effects can be entailed. To some extent it is used in colouring wine, and it would be interesting to know whether it could not be adopted as a substitute for some of those materials which are so deleterious. The urucu seeds could always be most easily procured, as the plant grows so abundantly.
 26. *Yerba de la piedra*, a Lichen (*Usnea*). When treated with an alkali, this plant yields a fine claret-coloured dye, due, as M. Parodi observes, to the development of the usnic acid.

As I have already stated, samples of these dyes, with specimens of home-dyed fabrics to which they have been applied, have been sent to Europe; but the process of dyeing in Paraguay is so primitive and unskilled, that no true estimate can be formed of the effects which the various colouring substances are capable of producing. They ought to be manipulated with modern appliances, and by trained workpeople, otherwise they will fail to do justice to Paraguay, and to be of proper service to commerce.

The cochineal might be easily acclimatized, as the nopal (*cactus opuntia*), on which the insect mainly feeds, grows wild in great abundance. A very insignificant outlay would suffice for this, and then the country would be in command of all

the requirements for prosecuting the dyeing industry. A well organized establishment for developing this design would have no lack of material, and could scarcely fail of success.

OIL PLANTS.—Of oleaginous plants it seems necessary to allude to only four: the ground-nut, the palm, the ricinus, and the cotton plant. They all grow wild in sufficient quantity to keep several factories in work.

The ground-nut (*Arachis hypogea*) is called *mani* in Spanish, and *manduvi* in Guarani. Oil made of ground nuts is universally known, playing, as it does, an important part in the composition of most of the oleaginous substances in use in Europe. Paraguay has always grown it plentifully. The nut is not only used for producing oil, but is consumed as an article of food, being either eaten raw, or dressed in various ways. The cultivation has proved so unprofitable that, whilst 1,146,171 'lines' were planted in 1863, only 349,425 'lines' were devoted to it in 1889. So large a decrease may be understood when it is remembered that, in 1863, no foreign oils of any kind were imported; whilst in 1886, the custom-house authorities registered the entry of nearly 100,000 lbs. of comestible oils, a fact that illustrates once again how foreign competition has exercised a disastrous influence upon the agricultural population of Paraguay.

Mani-seeds are used for making a kind of sweetmeat which is much liked, and would be sure to command a sale if it were taken up by the confectioners in Europe, who are already acquainted with the nut, which they introduce into their bon-bons in various ways.

Ground-nuts are largely grown in the Argentine Republic, and nothing is wanting but perseverance to place Paraguay in a position to export as much as any other country.

PALMS.—While, however, the cultivation of the ground-nut has thus been allowed to fall into decay, the country has succeeded in realizing some profit out of the coco-nut palm, one of the most abundant of its natural products. Among the different varieties that are scattered about everywhere,

there is one, the *mbocaya* (*Cocos sclerocarpa*), that seems to flourish on every kind of soil; but, valuable as it is, until quite recently it has failed to be duly appreciated. It has been pointed out that a serviceable textile material is to be extracted from its leaves, but it is the fruit also that ought to be a large and increasing source of wealth. Growing in large clusters, the nuts are full of a greenish yellow pulp which is highly oleaginous, yielding oil that is a very important article of commerce.

M. Mendioudou has opened a factory at Asuncion, at which, after expressing the oil, he converts it into soap, for which there is not only a demand in the country, but which he finds it advantageous to export. His enterprise is only one more example of what may be accomplished in Paraguay by dealing with the native products of the land. It is but a few years since foreign soaps had the monopoly of the market; the import, that in 1881 had been 81,930 lbs., had, in 1887, dwindled down to 1,710 lbs. ;* a falling off that speaks for itself, as it reveals the large opportunities that are offered for establishing home factories in Paraguay to deal with home produce.

Another similar manufactory has made a start, where, in addition to the coco-nut oil, there is a very considerable use made of animal oils, which for the most part are brought from Entre Rios. Over 19,000 lbs. of these were imported in 1887.

Besides the *Cocos sclerocarpa*, there is the pindo-palm (*Cocos australis*); the nuts of this are utilized very much in the same way as the former, but the tree is by no means so common, neither does it yield the same proportion of oil.

CASTOR-OIL.—The third of the oleaginous plants that I have specified is the ricinus. It is hardly possible to go for a walk anywhere in the country without seeing the deeply indented leaves of the castor-oil plant (*Ricinus officinalis*), known in Guarani as *mbaécibo*. Sometimes it attains a height of well nigh 20 feet, occasionally making a growth of

* The record for the intervening years stands thus:—1882, 47,458 lbs. ; 1883, 41,602 lbs. ; 1884, 14,602 lbs. ; 1885, 8,888 lbs. ; 1886, 1,689 lbs.

six feet in a single year. It requires no cultivation; the seeds may be gathered where they grow, and consequently are collected even more readily than those of the cocos, which have to be picked out of the droppings of cattle.* An Asuncion chemist has already exported to Europe some castor-oil, the many uses for which will always secure it a ready sale.

COTTON SEEDS.—With regard to cotton, it is only necessary to say that the seeds of the plant yield a valuable oil, 5,851 casks of which were sent from Paraguay to Antwerp in 1887. It is used for manufacturing purposes, as well as consumed in food. M. Mendioudou has given some attention to it, and in 1889 exhibited a good sample of it for use in soap-works.

MEDICINAL PLANTS.—And next, with reference to medicinal plants, it may truly be affirmed that to mention the mere names of all the indigenous plants that have some curative value would more than fill a volume. The knowledge of simples might be counted as a native science, and traditions, often Indian in their origin, have been handed down, and are still religiously preserved. Hence medicine-men (*curanderos*, as they are styled) abound in all parts of the country. They are much resorted to, and held in considerable esteem; their remedies consist entirely of *yuyus* (drugs). No doubt the plants of the country have remarkable medical properties; many of them are very full of tannin, and are strongly astringent. Nine times out of ten, if you ask an inhabitant of the place about any particular plant, he will give a knowing look, and only reply, "*Sirve para remedio*," to tell you that it is good for physic.

Although a vast deal has been written upon this subject, much of it is so empirical that it is difficult to attach much value to it. In the last century, two Jesuits, Father Pedro de Montenegro and Father Asperger, issued some curious publications on the medicinal virtues of the plants of Paraguay,

* Cattle are very fond of the fruit of the *mbocaya*, of which they void the kernel.

and the manuscript of the former is in the library of the Duchess of Osuna at Madrid. More recently, the eminent naturalist, M. Parodi, has published a valuable book on the same subject, and I may refer those who require more detailed knowledge to these works for information. I propose to limit my own observations to a few varieties of these plants which are in common use, and which seem to be available for exportation.

And in the first rank stands the *Coca* (*Erythroxyton coca*), which is generally known in the trade as the coca of Peru, although it grows very freely in Paraguay. There is, likewise, the *Erythroxyton tortuosum*, besides other varieties having similar properties, but containing considerably less cocaine, a circumstance which has led to the impression that Paraguay coca is less rich. This, however, is entirely an error, arising from the confusion of the species.

The *Jaborandi* (*Pylocarpus pennatifolius*) is known in the country as *ybiratay* or *yaguañandy*. M. Bonpland found it near Asuncion, and M. Baillon, professor of the Faculty in Paris, has given it a place in his herbarium. I have myself seen it in nearly all parts of Paraguay, and particularly near Ita and Yaguaron. M. Parodi states that there is another variety (*P. Sellowianus*) which, although nearly identical, contains less pilocarpine; upon this I have only to remark (as I have done in regard to the *jaborandi*) that it is not that the Paraguay kinds contain less alkaloid, but that the naturalists fail to distinguish between the allied species of the same plant. Both varieties ought to become important articles of commerce.

As regards *ipeca-cuanha* (*Cephaelis sp.*), it has to be said that what is found in Paraguay is not the true species. The trade in this drug that is carried on in the Brazilian province of Matto Grosso is very extensive, and as it is beyond a question that the Paraguay growth also possesses emetic qualities, although in an inferior degree, it would be desirable that it should be submitted to experiment to ascertain how far it is suitable for medicinal use.

The papaw-tree (*Carica-papaya*) is well known in the country under the name of *mamon*, and is not a spurious

species; its fruit is much eaten, and makes an excellent preserve. It contains a good deal of papaine, and the country people have discovered a singular property that belongs to it; when they want to ensure a piece of meat being tender for cooking, they wrap it for about two hours in a *mamon* leaf; peptonization at once commences, and, however tough the meat, it soon becomes fit to cook. It is to be regretted that this assistance to digestion is out of the reach of European cooks.

Balsam of Copaiva is extracted from several Leguminosæ, amongst which may be mentioned *Copaifera officinalis*, *C. Langsdorffii* and *C. nitida*. The quality of it appears uniformly good, and the few samples of it that have been exported are allowed to be very satisfactory. Locally it is used as an application for wounds.

The *palo santo* (*Guayacum officinalis*) is abundant in the Chaco, and there are several kindred species which are erroneously called by the same name. It is used as a sudorific, and has a reputation equally high as that of *sarsaparilla*, which is here likewise on its native soil, and may be said to be most in request of all the medicinal plants of the region.

The white *quebracho* (*Aspidosperma quebracho*) is another tree upon which experiments have lately been made with the view of extracting from it the alkaloid known as the *aspidospermine*. The tree grows freely in Paraguay, and I believe the first consignments of the drug were extracted from the *quebrachos* in the vicinity of Asuncion.

Under the name of *tarope*, the *Dorstenia Brasiliensis* is known nearly throughout the country; it was much used in the time of the Jesuits, and is still appreciated for its diaphoretic properties.

I need not again refer to the castor-oil plant, and propose giving a separate chapter to the orange.

The medicinal qualities of the foregoing are all well known; but there are other plants which would, if they were scientifically scrutinized, very likely reveal some medical virtues. Among these should be reckoned the *cordo santo* of the family of the Papaveraceæ, which has doubtless some sedative property.

M. Parodi classes it with the *Argemone mexicana*, and asserts that it contains a considerable quantity of morphine. Another narcotic is found in the *cururu-ape* (*Paulina pinnata*).

Caa-imbe-mi (*Valeriana panniculata*) is another sedative that deserves to be carefully analyzed ; it is employed in Paraguay in cases of hysteria.

As purgatives, it may suffice to refer to two Euphorbiaceæ, viz., the *caa-pari* and the *piño*, both of which are very drastic in their action.

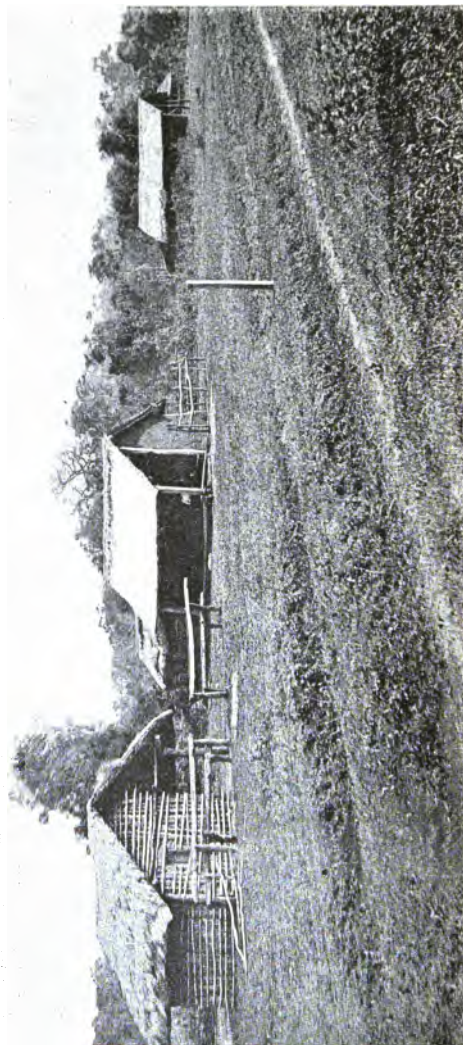
Astringents, as I have stated, are numerous, one of the most efficacious being the *caa-ne* of the chenopodium tribe ; this however is less binding than the *guaycuru*, the root of which is already known in Europe ; it has, to my knowledge, been very successfully used in diarrhœa.

Another plant which should not be forgotten is one of the Artocarpus tribe, called *amba-y* in Guarani, and *yarumba* in Panama. This is a strong diuretic, and American doctors, whose experience has led them to administer it, assert that its properties are very similar to those of digitalis.

Amongst healing plants there are the *quina-quina* (*Myrospermum ceraïpu*), which yields the balsam of Peru, and the *aquara-yba-guazu* (*Schinus arocira*), from which Father Asperger extracted the renowned balsam of the Missions ; but, although still in demand locally, this resinous composition is gradually falling into general disuse.

Such are plants which seem to me to be interesting from a medicinal point of view, and they are numerous enough, I should suppose, to satisfy the ambition of the most enthusiastic herbalist.





F. Hon. Nourit et C^{ie}, Paris.

IN THE WOODS. — A YERBATEROS' SETTLEMENT

CHAPTER X.

YERBA-MATÉ.

Discovery — Use — Physiological importance — Yerba-forests — Gathering —
Wages of yerbatero — Statistics of export.

In my account of the explorations that I made on the Ygatiimi, I have already described my excursions into the woods that produce the Paraguay tea; so that I need not again enter into the details of the singular industry that has for so long been carried on in the recesses of the virgin forest. Confining myself here to the subject of its commercial importance, I refer to my previous work for particulars about the various processes which the plant undergoes in its preparation for use.

Paraguay tea, which is called *caa* in Guarani and yerba-maté in Spanish, is made from the leaves of the *Ilex Paraguariensis*, which was thus named by the illustrious Geoffroy St. Hilaire.

The Indians introduced it to their Spanish conquerors, and from the date of its discovery it has been the common drink of the populations that have come to seek their fortunes in the New World.

The habit of taking it became so inveterate, that the Jesuit Fathers, who had first encouraged its consumption, began to remonstrate, and to interfere with its being drunk every day. Father Asperger, too, after lauding its physiological virtues, commenced denouncing all who partook of it immoderately, and drew a frightful picture of the maladies to which they were exposing themselves. His counsels probably prevailed to check the inordinate use of it; at any rate, it is undeniable that maté has continued in favour with all succeeding generations, and has not wrought any mischief among the people by depriving them of health or strength.

At present the use of maté is still spreading and becoming universal throughout South America; not only is it drunk by the descendants of the ancient conquerors, but it is highly appreciated by all the new-comers. So far from decaying, as for a while looked likely, the yerba industry is growing, continually promoted by the arrival of immigrants who increase the demand.

What then, it may be asked, are the properties of a plant which, hardly known in Europe, is so extensively consumed in South America? And how are we to account for the approval it never fails to find amongst those who put its qualities to the test?

By M. Marvaud the yerba was classed as an economic food along with coffee, tea, cocoa, and alcohol; this classification, however, has been challenged, on the ground that recent analyses have revealed a more accurate knowledge of the character of these substances.

For example, it is asserted that coffee, instead of forwarding nutrition, is proved to be a non-assimilating agent. M. Leblond,* too, in 1883, came to the conclusion that, though the quantity of urea may generally be diminished in the urine by taking an infusion of caffeine once, yet in the whole day the total would be increased beyond the normal average. Coca acts, it is said, in the same way, and Gazeau convinced himself that by taking half an ounce of it a day he increased the production of urea by 11 per cent. Espinoza also arrived at similar conclusions. Tea has not been submitted to the same rigorous tests, but it may be presumed that its action is in general analogous to that of coffee.†

Upon these grounds it is maintained that M. Marvaud's classification was based upon error, and must now be rejected as an antiquated theory. Coca, tea, and coffee are no longer to be considered as medicaments; indeed, the proportion of azote that they contain is so small that they can barely claim to be alimentary products at all. It may be that their tonic

* Leblond, *Thèse de Paris*, 1883, *La Caffeine*.

† The alkaloid in tea is chemically the same; caffeine and theobromine are isomeric substances.

influence upon the nervous system is undeniable, but it is exercised at the economic cost of increasing combustion, the small quantity of nitrogen that is contributed to the system being far outweighed by the loss of urea which is entailed.

It remains for us to consider cocoa, alcohol, and maté.

Cocoa may be dismissed at once, as it is no longer classed with any but plastic aliments, so inappreciable is its dynamic energy. As for alcohol, it is the true economic aliment; so far from stimulating combustion, as is generally held, it is demonstrated by Dujardin Beaumetz positively to retard it, by withdrawing a certain quantity of oxygen from the blood-globules.*

Whilst, then, these long-standing theories are being abandoned as untenable, we may well be excused if we turn to such a product as yerba-maté, and ask—What is the position of that which constitutes the daily drink of half the population of the New World?

The least that can be said is that it has held its own. Not only Marvaud, but Coutier d'Arsonval, Espery, and Doublet have demonstrated that it not only diminishes the secretion of urea, but that it stimulates the physical and mental powers without any waste to the system.

And herein lies the secret of the partiality of Americans for maté; it is not from any scientific disquisitions, but from practical experience, that they have satisfied themselves of its immense superiority over coffee and tea. The coca is just as available for them as the ilex; both are ready at hand; but whilst the latter has become as indispensable to them as their manioc, the coca has been rejected, and is used now only by a few Indian tribes, and some residents in the mountain districts. Such a practical verdict in its favour proclaims its excellence; it is a popular, as distinguished from a scientific, tribute to its praise, and may well provoke the inquiry why the Old World has remained indifferent; so that while it has been importing tea from China and the East, and coffee from Arabia, it has had no recognition to bestow on the maté of South America?

* Dujardin Beaumetz, *De l'alcohol, sa combustion, son action physiologique*. Paris, 1884.

Yet the supply is adequate to all possible demands; subject, however, at present, it must be owned, to the disadvantage that the yerba is under no well-organized system of cultivation.

The Jesuits no doubt were well acquainted with a method for securing its constant reproduction. All round their settlements they had plantations of it that supplied the requirements of their converts; but after their expulsion the secret disappeared, and hitherto has not been recovered. A reward has been offered to anyone who shall succeed in devising a means of propagation, and I do not doubt that, with a little attention and patience, the means will be discovered.

Between lat. 22° S. and 29° S., and to the east of long. 57° W., the *ilex paraguariensis* grows quite wild. Towards the sea the forests lessen both in magnitude and quality of yield, and at the Sierra do Mar they almost entirely disappear. The area over which they extend includes a portion of Paraguay, the Brazilian provinces Matto Grosso, Santa Catharina, and Rio Grande do Sul, and the Argentine district of Misiones. In former times *yerbales* would seem to have existed right away as far as the banks of the Paraguay, and it is affirmed that a few isolated instances occur of the *ilex* being found in the province of Salta, in the Andes. At the present time the *yerbales* must be considered to be bounded by the limits that I have specified.

In spite of assertions that have been made to the contrary, it may confidently be maintained that the maté of Paraguay is that which is held in the highest reputation, a fact that is corroborated by the figures quoted later on. Under the name of "Paraguay maté" must be included (according to the practice of the trade) all that is exported from the various ports of the State, whether grown within its own forests or in those of the Ygatimi valleys. The latter, which belonged to Paraguay until 1870, were annexed to Brazil after the war, but their produce continues to be conveyed along the old routes. Altogether, however, this produce does not materially affect the statistical returns of the Paraguay *yerbales*.

Distributed generally according to their locality, the maté forests are known as the *yerbales* of Jesus, of the Parana, of

San Estanislao, of Ygatimi, of San Pedro, and of Villa Concepcion. The export places are Tacurupucu and Villa Encarnacion on the Parana, and Asuncion and Villa Concepcion on the Paraguay. Thence the tea is forwarded to Rosario and Buenos Aires, in Argentina; to Monte Video, in Uruguay; and to Corumba, in Brazil.

Statistics for 1886 show the export in that year to have been 442,940 arrobas, or about 110,700 cwts.; in the following year it was 557,660 arrobas, or 139,400 cwts.

To estimate the annual production, the local consumption must be added to this total export. If the computation be allowed that a family of six or eight members, of which three or four would partake of maté every day, would consume an arroba (25 lbs.) in two months, it would follow that the home population would require 510,000 arrobas, or 130,000 cwts. annually. Including the export, the total production would thus amount to 270,000 cwts., which represents a large revenue to the State.

The price of yerba varies according to the repute of the merchant, the favourite brands being those that bear either the trade-mark T. L. (Thomas Larangeira), or the Maltese cross (Industrial Paraguaya).

Yerba is sold in the Buenos Aires market at from \$.450c. to \$.5 the arroba; this is the export price, with the additional cost of carriage. At Asuncion, for local use, the price is \$.250c. to \$.260c. the arroba.

In the preparation of the maté, nothing is of greater interest than the working of the yerbales from which it is procured.

The great forests where the ilex abounds are, as already stated, in the eastern part of Paraguay. To reach these forests, long desolate tracts have to be crossed; the gatherings entail much labour; and the responsibility of the head yerbatero, who has to convey the products of the harvest out of the wilderness, are considerable.

Speaking generally, the working of the yerba-maté industry may be said to consist of four operations; 1st, the gathering; 2nd, the preparation of the leaves; 3rd, the conveyance to the head depôt, and the packing; and 4th, the transport to

the different markets. The gathering in the woods is done by men called *mineros*, the pay of a *minero* being 15 centavos (about 7d.) for each arroba of leaves that have been slightly singed (*overeadas*). The leaves have next to be dried in a *barbacua* over a slow fire, a process during which they lose half their weight; the *uru*, or workman, who superintends the drying, is paid 15 centavos for each arroba of dried leaves; pounding the leaves with a wooden-beater costs a further 5 centavos, so that the expense thus far is 50 centavos, i.e., about 2s. for each arroba. Next follows the expense of the transport, which is done by carts drawn by six bullocks, and this, including the outlay for sacks, must be set down as 45 centavos. There remains the cost of conveyance from the depôt to the market either at Asuncion or Villa Concepcion; this is usually made by water, the freightage being at the rate of 25 cents., or 1s. for each arroba. After making an allowance of 2 centavos on every arroba for accident or damage, it would seem to result that the net cost of the leaves, from their gathering to their arrival at the market, is \$1.22c., or something less than 5s. the arroba.

More frequently than not, a yerbatero who has undertaken to work a maté forest, after gathering and drying the leaves, sells them on the spot to a trading company, which takes all the subsequent responsibility, providing the transport and carrying out the sale both at home and in foreign markets. The contract between the yerbatero and the company generally allows the yerbatero a profit of about \$1, or 4s. an arroba; and thus the original cost to them is \$2.20c. to \$2.25c. By comparing this with the selling price it will be seen how large a profit is realized. Evidence of this is furnished by the accounts of the largest of these companies, the Industrial Paraguaya, which in 1888, the first year of its existence, paid its shareholders a dividend of over 60 per cent. All these figures speak for themselves, and demonstrate the commercial value of the yerba-maté.

Hundreds of labourers are employed in gathering the yerba, all in receipt of good wages, for an industrious *minero* is quite able to earn from \$2 to \$3 a day. A yerbatero ought





A CONVOY O



E. Plou, Nourrit et C^{ie}, Paris.

VERBATEROS

to be able to realize a fortune in the course of a few years; indeed I have known of one who gathered 150,000 arrobes in one season, which could hardly yield him a less profit than £20,000. And not only are the companies making splendid returns, without any appreciable risk, but they are bringing into existence a host of employés, boatmen, agents and retail dealers, all of whom are in a position not merely to earn a good livelihood, but to accumulate considerable savings.

The Government likewise has its share in the profits of this industry; for, as owner of the yerbales, it claims payment of a rent. Of late years, however, it has been the practice to sell the yerbales instead of letting them, and making the tea subject to an export duty, which, although very light, runs up in the aggregate to a very important contribution to the revenue.

Ever on the increase is the demand for yerba-maté, although the consumption remains strictly limited to America. When the Old World discovers its error in not utilizing the leaf of the ilex,—when the working-man, instead of drinking indifferent coffee, adulterated with chicory, burnt barley, and sometimes with plaster, shall have found out that yerba-maté is the cheapest, most wholesome and tone-giving of beverages, then the ports of Europe will be thrown open to the trade, and its populations swell the demand for an article of diet that ranks among the very best.

CHAPTER XI.

THE ORANGE.

Origin—The *apépu* or American orange—Other varieties—Distribution of orange trees—Vitality—Gathering—Export—Price—Orange-wine—Orange-trade—Essence de petit grain.

It is affirmed that the orange is not indigenous to Paraguay, but I have great difficulty in believing it.

Everywhere, on the banks of the rios, in the gorges of the far-off sierras, near the *ranchos*, round the *estancias*, in the solitude of the forests, the trees are seen with their golden fruit and deep-green foliage, in lines, in terraces, in groves—everywhere, on mountains and on plains, they grow and break the blue horizon with their rounded outline—and it seems as if they must have flourished there from all antiquity.

I am quite ready to admit that the sweet orange, the bitter orange, the lemon, and their numerous varieties were imported either by the Spaniards or by the Jesuits; of this there can be little question; the original habitat of them all was in Asia, and the history of their dissemination is well known; but at the same time there is a Paraguayan orange specially belonging to itself. It has a flavour that is slightly acid, which makes it very acceptable in hot weather; without cloying the palate like the sweet orange, or setting the teeth on edge like a lemon, it seems to cleanse the mouth in a way that is very refreshing. So far from growing everywhere, it is found chiefly in the depths of the forests and on the banks of insignificant streams. I have met with it in the most remote places, in the unexplored valleys of the Ygatimi, and on the margin of the Upper Parana, where it could certainly never have been introduced by human agency. So abundantly does it grow on the Parana above the Salto de Guayra, that during a flood I have seen numbers of them drifting down the stream.

The Guaranis call it *apépu*, which is a very ancient word

in their language, and in my opinion carries with it an argument for the tree being of American origin, for all other varieties of the orange, without exception, are distinguished by Spanish names. It may, I think, be taken as almost an invariable rule, that whatever has been imported into the country by the invaders has retained its Spanish name, the aborigines not having been at the pains to assign it any name of their own. At most, the final syllable has undergone a slight change to suit local phonetic laws. The Indians thus say *cavayu* (cabálla, horse), *sombrero* (hat), *cuchillo* (knife), *ovetcha* (oveja, sheep); but when *apepu*, a purely Guarani word, like *goyave*, *manioc*, *pety* (tobacco), or *yety* (sweet potato) is perpetuated, it is the natural inference that it refers, as they do, to a native and indigenous production.

But, after all, whether oranges of any kind are indigenous to Paraguay or not, it is very certain that they well might be, for the whole world could not show a soil that is more favourable for their growth.

Without attempting to enumerate all the varieties of oranges and lemons that are found, I may mention the following as being the most common:—The sweet orange (*citrus aurantium*); the bitter orange or bigarrade (*c. bigaradia*); the madarin orange; the apepu; the citron (*c. medica*); the toronjo (*c. limonium citratus*); the common lemon (*c. limonium*); the lime or sweet lemon (*c. limetta*); and the lime of Persia.

It would be quite impossible to form a true estimate as to what extent of area in Paraguay is taken up by this orange-growth. Sometimes singly, sometimes in clumps, sometimes in vast forests, as in part of the Missions, the trees thrive in almost every district—here under cultivation, there entirely wild.

Before the war brought its five years' desolation over the land, orange plantations were very numerous. The Jesuits had them round all their settlements, and there was not a Spanish colony without its orange-grove. The invading troops, however, set them on fire, and otherwise ruthlessly destroyed them.

Fortunately, the vitality of the orange-tree is very great, and in such a climate as Paraguay it shoots up with marvellous energy. Let a leaf be carried by the wind on to a favourable position, and to a moderately light soil, it will soon throw out roots from which the little shrub will begin to grow; or let a pip be dropped from a parrot's beak, and it will be pretty sure to germinate and thrive.

Consequently, the ravages of warfare have been repaired to a considerable extent; so that now, within twenty years, nature has done much to replace the loss, and the *naranjales* have sprung up afresh, not, indeed, so regularly as before, but luxuriantly, as though planted by the colonists themselves. The yellow fruit again gives its brightness to the woods.

The great orange-season is from the beginning of May to the end of August. By this I mean that the operation of gathering the fruit goes on at that time; but the trees are in bearing more or less all the year round, neither fruit or blossom ever completely failing; they mingle one with the other, and give their witness to the perpetual fecundity of the species.

One of the chief features of the trade is the conveyance of the fruit to the various marts. All along the Paraguay from Asuncion to Humaïta, during the four winter months, sailing boats and steamers are in constant employment carrying cargoes of oranges from the dépôts, such as Villeta or San Antonio, to which they have been brought in carts containing loads of about 5,000, which can only be drawn laboriously by three yokes of oxen each.

Very frequently, before being delivered at the port, an orange-crop will have been purchased by brokers who have gone up the country and bought it on the spot; but it is quite common for the growers themselves to offer it for sale upon the quay, and a buyer is not often long in being found. The fruit is taken from the carts, and piled up on the quay in places reserved for it and handy for shipping. And a picturesque sight it is to watch the Paraguayan women, always lithe and graceful, laughing merrily over their work, as they rush like a troop of ants, and carry their loads dexterously

from the pier over the gangways, and deposit them in the holds of the steamers, which are despatched with all haste to Buenos Aires and Monte Video, to meet a demand that is never adequately supplied.

The price of oranges varies according to their abundance in the market; not that this has anything to do with production, for the orange-crop itself is always abundant; but the price depends entirely upon the quantity offered for sale by the growers, who, if they should happen to have any other crop that will provide them with subsistence for the year, will simply allow the oranges to rot where they grow, without being at the trouble of gathering them. Thus, for example, in 1887 a hundred *almuds*, that is to say, 5,000 oranges, were sold at Villeta for \$20 (£4), whilst in the interior they only fetched \$8. In 1888, on the other hand, the price at Villeta was \$1 a thousand. Twenty oranges a penny, and that after conveyance to the port! And such oranges! more fragrant and more juicy than any that Italy or Valencia could show!

Official returns state that over 50,000,000 oranges passed through the principal ports of Paraguay in 1886;* and this number would be a third as much again if those could be included that were disposed of from the small villages, or the *estancias*, where there is no vigilant eye of a custom-house officer to exercise control.

To reckon up the number of oranges that are consumed in the country, so as to include those that rot on the trees, or that are devoured by birds, monkeys, and other animals, would be about as difficult as to count the grains of sand on the sea-shore. Hardly a Paraguayan could be found who does not suck from 20 to 30 oranges a day, and yet there is no sign of diminution of the golden crop amidst the dark-green foliage. What it would be if cultivated systematically, only imagination can conceive.

Recent experiments have gone to prove that Paraguay oranges can be made to supply a wine that, at the end of two months, may be drunk from the cask without retaining any

* This would be only the produce of the immediate environs of Villeta, San Antonio, and Villa del Pilar. The oranges from the interior are not exported.

of the flavour of the original fruit. This, at any rate, might be brought into competition with the abominable concoctions which are brought into the country under the name of *wine*, with which they have nothing in common beyond the bottles and labels. A load of 5,000 oranges should produce a *bor-delaise* of this wine, the cost of the raw material, as estimated by the market price of 1888, being about £1.

But, without advancing to such pretensions, it would, beyond question, be quite easy to extract alcohol from the orange-pulp. A hundred *almuds*, costing about a sovereign, would yield, under very moderate pressure, about 100 gallons of juice, which, when distilled, should give 10 gallons of spirit of a strength of 20 degrees Cartier. This estimate, which is the result of actual experience, may serve to show how the introduction of European appliances would make such distillation a lucrative line of business. At a minimum outlay, a large premium is sure.

Up to this point I have been speaking only of the sweet orange. But the bitter oranges and lemons may be dealt with quite as profitably. A French colonist, some time since, entertained a project for making them yield the citric acid so much in demand in the dyeing trade. He opened a small factory at San Lorenzo, but not being sufficiently skilled in chemical appliances, he failed in arriving at satisfactory results. Instead of using chalk and quicklime for the process of reaction, he took it for granted that the ordinary Corumba lime would answer the purpose; consequently, the crystals he obtained lacked the proper clearness, and were not approved of by the trade. Discouraged by the result, he did not persevere in his experiments; but there can hardly be a doubt that if the enterprise were taken up by more practical men, it would be soon carried out to a successful issue.

M. Ravery, an Asuncion chemist, with better fortune, has succeeded in getting specimens of citrates of lime and iron in excellent condition for use.

But chemistry has no monopoly; it must share with cookery, its twin sister, all rights pertaining to these varied fruits. The confectioner, as much as the dyer, may be indebted to them

in his arts ; and the citron, the little green orange, the China orange, and the sweet lemon, may severally be employed in the making up of those sweetmeats which, all the world over, are so popular. No manufactory for preserves and bon-bons has hitherto been tried ; but there would seem to be no reason why Paraguay should not compete with Europe, that now exports its toothsome productions to America.

The bitter orange is by no means an unprofitable fruit. It is not edible, but it yields several useful products. Besides the oxalic and citric acids, and their compounds, which are extracted from its pulp, it must be remembered that the peel furnishes several medicinal syrups, and that it is a main ingredient in curaçao, the liqueur which has so many patrons. The peel is delivered at the port of Asuncion, fetching about 25s. per 100 lbs., and a trade that may be described as active has been commenced. A small venture was made in 1887 by a firm in Asuncion, which turned out well. In the course of a month, over 3,000 lbs. of peel were exported, being the yield of about 100,000 oranges. The figures, of course, in themselves are unimportant, and are not to be regarded as any token of a commercial movement of any account, but they are nevertheless significant as showing a trade tendency which a keen observer may improve.

If, instead of sending the bitter orange peel for sale, it should be desired to utilize it where it has been collected, there would be need of only a very simple apparatus to produce the compound known to druggists as the "Essence of Portugal," which uniformly commands a high price. This has not as yet been made anywhere in Paraguay.

It is by no means to the fruit that the produce of the orange must be limited ; every part of the tree has its special use ; the blossom can be distilled, essential oil may be extracted from the leaf, and the trunk is not to be despised as wood.

To judge by the extent of the forests of the citrus tribe that cover the country in all directions, it might almost be assumed as a matter of course that orange-water would be a leading article of manufacture. Such is by no means the case. The influence of Francia and Lopez arrested every industrial pur-

suit, and now, just as twenty years ago, the white corollas of the orange-blossoms are suffered to wither and die, without the idea ever crossing the minds of the people that here is a material from which they could express the perfume for which the world is ready to barter its gold.

M. Balanza, a French botanist who came to Paraguay in 1873 to study the flora, was amazed at the apathy which permitted such waste, and for a while he discarded his herbalist's case, procured a serpentine still, and became a distiller, being so far successful that he obtained an essence, the *oleum neroli*, of a very superior quality. But he found he had many difficulties to contend with. In addition to the oleum, he was extremely desirous of producing distilled orange-flower water; but this was not easily done. In order to obtain an essence with the full maximum of perfume, it is necessary that the blossom should be gathered just as the petals are opening and disclosing the heart of the corolla. In Europe this is practicable; there in the spring all the buds on a tree will usually open at the same time, and as soon as the petals are unfolded they can all be shaken at once into cloths that have been spread underneath to catch them, and so can be collected without being touched by the hand, which deprives them of a portion of their fragrance. Such a method cannot be followed in Paraguay. The bitter oranges grow so clustered together in the forests, that the blooming comes on very irregularly, and unopened buds, flowers in full show, and withered blossoms will all be found on the same tree. It is unavoidable, therefore, that the blooms should be gathered separately, and this not only greatly increases the labour, but it materially deteriorates the petals, on which the slightest touch leaves a stain. Only one way of proceeding would ensure a simultaneous flowering; the trees would require to be planted thirty feet apart, so that the vegetation of each should be unchecked. I have seen a plantation laid out on this principle as in Europe; but it is a mode of cultivation quite exceptional. M. Balanza found the obstacle to his experiment so serious that he ceased distilling from the flowers, and confined his operations solely to the leaf.

Under the name of *essence de petit grain*, perfumers use a distillation of orange leaves, which forms a sort of base for many of their preparations. It has become very common, and is being substituted where *neroli* was formerly considered necessary. Its name originated in its being first expressed from the fresh-formed green fruit in its earliest stage, when no larger than a nut. The product, which is now obtained from the leaf, is almost identical in its properties, and by the custom of the trade it is called by the old name.

By thus turning his attention to the capabilities of the leaf, M. Balanza was the first to start that industry in Paraguay, which is now represented by a good many distillers. These for the most part are found in the neighbourhood of Yaguaron, on account of the abundance of bitter oranges all round.

Nowhere in Paraguay is the scenery brighter and more attractive than here. Pleasant prairies, dotted with cattle, and relieved by dark green foliage, rise in terraces upon the gentle slopes of the Costapucu ridge, whilst ever and again some detached eminence shows its rounded summit above the general level, breaking the horizon with its graceful outline. Nor is there any eyesore, as too often in the manufacturing centres of Europe, to mar the poetry of the landscape; no distillery chimneys belching out volumes of smoke, and obscuring everything. The factories are of a more modest order; a clear stream rippling through the orange-groves, a rancho covered with palm leaves, and a furnace fed by wood of delicious fragrance, these are all the accessories which the work demands.

And the apparatus within is as simple as the arrangement without. A generator, of which the pressure never exceeds that of the atmosphere, forces the vapour to the bottom of a large vat in which the leaves are piled. In the upper part of the vat is a cap, connected with a long tube, which receives and conducts the charged vapour into a refrigerator, whence the condensed essence issues into a glass vessel, which acts as recipient. Nothing could be more primitive or less costly, and yet nothing could be more practical. Experiments have been tried again and again, but it remains clear that the most

perfect machinery is ineffectual in producing a larger quantity or a better quality of the essence. No improvement, therefore, seems to be required upon M. Balanza's still, which has produced the following results :—

About 25 lbs. of the leaves of the bitter orange can be bought of the growers and delivered at the factory for about 7½c. to 10c. From 300 lbs. to 350 lbs. produce about 1 lb. of essence, which is sold at Asuncion, according to the state of the market, for 1dol. 80c. to 2dols. 73c., yielding a gross profit of from 20c. to 1dol. 40c. per lb.

To establish a small distillery requires scarcely any outlay, and the labour is equally insignificant: once charged for 36 hours, the apparatus needs no attention beyond keeping up the fire, which would not occupy a workman more than 3 hours a day. Upon an average, a comparatively small distillery on Balanza's system will yield somewhere about 100 lbs. of the *essence de petit grain* every month, yielding a gross profit of 75 to 100 pesos, bringing the owner, out of a gross return of £30, a net profit of not much less than £25.

In Paraguay altogether there are 30 of these stills; 20 at Yaguaron, 4 at Ita, 3 at San Jose de la Cordillera, 1 at Itacuruby, and 2 at Nembuy. These should produce a total of about 3,300 lbs. a month, or 40,000 lbs. a year. The production is enormous compared with the entire consumption in Europe, which scarcely exceeds 50,000 lbs.: and the result has been that the manufacture in Italy and the South of France has been much diminished, the American competition proving too strong.

Such, in brief, are some of the valuable qualities of the Paraguayan orange, which not only supplies the people with an acceptable food, but promises to become the material of important industries. Hitherto experiments have been only desultory, utilizing one element, but overlooking another; but in the future, a skilled and scientific generation of manufacturers will be sure to arise, who will know how to make the most of each and every element alike. From the peel, from the blossom, from the leaf, will be extracted all the various essences, including the orange-flower water; from green oranges, lemons,

and citrons, preserves of many varieties will be invented ; the dried peel will find ready buyers in the distillers of curaçao and bitters ; the pulp will yield citrates and tartrates, for which there is ever a demand ; orange-wine will be made for local consumption ; spirit will be distilled, pure enough to compete with the native caña ; lemon-syrups will be made, which will be exported, not only to Buenos.Aires, but even to Bordeaux ; and, last of all, when the trees have ceased to be prolific, the trunks will be disposed of to cabinet-makers, who are ready to give good prices for the wood.

Such are the manifold ways in which the valuable growth is to be utilized. Its culture ought to be developed into an ever-expanding trade, and an incalculable service would be rendered to Paraguay by taking full advantage of this valuable resource, which is now neglected and allowed to be wasted, almost unknown to the outer world.

APPENDICES.

I. STATISTICAL SUMMARY OF PARAGUAY.

Area.—97,700 sq. miles, or 62,528,000 acres.

Population.—(Inclusive of 100,000 uncivilised Indians) 600,000.

Agricultural Statistics.—Cultivated area in 'linas' ('lines' or 'rows') of 235 feet each.

	1886 (linas).	1889 (linas).	1889 (acres).*
Maize (Indian corn) - - -	3,233,708	4,435,060	41,000
Manioc - - - - -	2,279,634	3,423,234	31,670
Beans - - - - -	1,227,587	1,249,983	5,700
Rice - - - - -	186,324	180,336	1,410
Mani (ground nuts) - - -	345,621	349,425	5,400†
Barley - - - - -	5,618	—	—
Potatoes, vegetables - - -	109,141	262,570	1,386
Lucerne - - - - -	—	93,561	—
Sugar-cane - - - - -	387,686	430,969	3,980
Tobacco† - - - - -	912,854	912,918	14,090
Coffee, trees, number - - -	26,116	33,966	—
Cotton - - - - -	190,624	61,317	160†

Live Stock :—

	1887.	1889.	1890.
Horses - - - - -	88,106	100,705	99,693
Mules - - - - -	2,763	2,095	2,433
Asses - - - - -	2,463	2,359	2,188
Horned cattle - - - - -	912,245	790,617	861,954
Sheep - - - - -	42,490	64,366	62,920
Goats - - - - -	15,542	11,659	14,656
Pigs - - - - -	13,375	9,094	10,770

* This is merely a rough approximation, from which other estimates differ widely. The Statements in No. 1006 of "The Diplomatic and Consular Reports" are utterly untrustworthy, the cultivated area being given at over 22 million acres!

† Estimated yield (1890), 20,816,000 lbs.; exported, 15,588,000 lbs.; available for home consumption, 5,228,000 lbs., or 8½ lbs. a head (see p. 190).

Commerce.—*Annual value of Imports and Exports in Pesos gold :—*

Period or Year.	Imports—Pesos.	Exports—Pesos.
1851-3 - -	500,702	451,164
1854-6 - -	975,630	552,631
1857-9 - -	1,702,073	1,180,294
1881-3 - -	1,159,888	1,781,740
1884-6 - -	1,515,228	1,600,509
1887-9 - -	2,975,313	2,252,615
1890 - - -	2,725,612	2,901,589
1891, 6 months (Asuncion only.)	810,865	1,112,012

Value of principal articles of Imports and Exports, in Pesos gold :—

	1889—Pesos.	1890—Pesos.
<i>Imports :—</i>		
Corn - - - - -	221,430	160,129
Articles of Consumption - - -	485,712	612,836
Drinks - - - - -	555,909	428,046
Textiles - - - - -	725,365	471,913
Clothing - - - - -	62,069	47,442
Haberdashery - - - - -	171,402	112,632
Hats - - - - -	54,256	28,435
Hardware - - - - -	158,735	103,513
Iron and Ironmongery - - -	84,536	66,315
Railway Materials - - - - -	78,800	266,595
Machines - - - - -	126,079	82,012
<i>Exports :</i>		
Yerba-maté - - - - -	1,293,476	1,251,450
Tobacco and Cigars - - - -	445,654	619,717
Timber - - - - -	287,609	488,126
Ox-hides - - - - -	219,183	323,244
Oranges - - - - -	59,180	95,205

Customs' Duties are levied upon Imports and Exports.

The following articles are admitted free of duty :—

Machinery, agricultural implements, railway materials, fire engines.
 Gas and water pipes, cement, wire for fences and telegraphs.
 Coal, iron (pig, sheet, bar), copper, gold and silver.
 Barrels, bottles.
 Books, maps, printing paper and materials.
 Animals for breeding, plants, vines, seeds.
 Lime, soda, resin, sulphuric acid, gums, &c.
 Barley, corn, fresh fruits, fresh fish, sugar.

Duty is charged *ad valorem* on the following articles :—

Firearms, ammunition, spirits, fine wines, tobacco, cigars, playing cards, perfumery—89 per cent.

Clothing, boots, saddlery, carriages, furniture, and manufactured goods generally—79 per cent.

Wines, beer, ale, silk goods—69 per cent.

Flour—29 per cent.

Zinc—8 per cent.

All other articles—64 per cent.

Export Duties are charged upon yerba-maté (25c. or 30c. per arroba), tobacco (15c. or 25c.), and hides 1 peso per arroba.

In addition to the above duties, port dues are levied upon most articles imported or exported.

The *Custom-house Receipts* were as follows :—On imports, 1888, 1,216,791 dols. ; 1889, 1,265,575 dols. ; 1890, 990,451 dols. On exports, 1888, 172,321 dols. ; 1889, 154,307 dols. ; 1890, 193,627 dols.

Railways.—The only railway in operation is that which connects Asuncion with Villa Rica (95 miles), and has recently been extended to Yuty (54 miles). It is intended ultimately to reach the Paraná at Villa Encarnacion (75 miles), where it would join a railway giving direct access to Monte Video. In 1889 this railway conveyed 404,770 passengers.

The construction of a second railway has been authorised by a Law of August 27, 1891. It is to connect Asuncion with Santos or some other port on the Atlantic Ocean. M. Manuel Obert, of Thieusis, is the concessionaire of this "Trans-Continental Line." Government guarantees 6 % interest for thirty years on an expenditure of £9,600 per mile.

A third line, proposed by Dr. Stewart, is to connect Puerto Pacheco on the Paraguay with La Paz, the principal city of Bolivia.

Navigation.—In 1890, 1663 steamers and 1287 sailing vessels, of 176,692 tons burthen, entered the ports of Paraguay. Of these vessels, 381 of 126,563 tons came from abroad.

Finance :—

REVENUE (Pesos paper).				EXPENDITURE (Pesos paper).
	Land Sales. Pesos.	Customs. Pesos.	Total Pesos.	Total. Pesos.
1887	1,686,244	1,153,520	3,044,561	1,398,504
1888	1,915,445	1,389,132	3,551,445	2,791,558
1889	2,390,304	1,419,881	4,124,674	4,252,797
1890*	324,874	1,183,426	1,736,173	3,242,631

* The deficit of 1890 was covered by an emission of Bonds (500,000 pesos), a loan from the National Bank, and the sale of land.

DEBT, December 31st, 1890.

	Pesos.	£
<i>External</i> (in gold).—London Loans . . .	4,218,000	843,600
Brazilian Indemnity, including accrued interest . . .	9,876,466	1,975,293
Argentine, do. . .	9,563,990	1,912,778
Argentine National Bank. . .	42,590	8,518
Total . . .	23,701,046	4,740,189
<i>Internal</i> (including liabilities of all kinds) in paper	Paper 9,268,426	333,633

The *Internal Debt* is inclusive of Cédulas or Land Warrants to the amount of 5,580,500 pesos, not yet converted into lands, in accordance with the agreement made with the London bondholders (*see* p. 85).

The assets of the Government far exceed the amount of the Internal Debt. They include Preference Shares in the Central Railway (£210,000); shares in the National Bank and the Bank of Paraguay (4,101,707 pesos paper); various, 1,330,402 pesos paper, or a total of £405,556. This is exclusive of the value of the land ceded to the London bondholders, and represented by cédulas.

Banks.—There are four banks in Paraguay, with a capital of 15,500,000 pesos. Of these the National Bank is the State bank since 1890. This bank, as also the Bank of Paraguay and the Rio de la Plata, are authorised to issue notes. The Hypothecary or Mortgage Bank makes advances upon real estate, but does so in cédulas, bearing interest at the rate of 10 per cent. in gold, which the borrower is obliged to dispose of as best he can.

Defence.—There is a small army of 82 officers and 1,345 men, but every citizen is liable to service in the militia between the ages of 20 and 35. Three small steamers patrol the Paraguay.

A line of **Telegraph** connects Asuncion with Corrientes in the Argentina; 28,322 messages were sent in 1890, but the receipts only amounted to 9,087 pesos.

Postal Services.—There were in 1890, 63 post-offices; 539,153 letters, &c., were transmitted or received, and the postal revenue amounted to 17,203 pesos.

II.—IMMIGRANTS AND AGRICULTURAL COLONIES.

The following are the advantages accorded to immigrants by the Government of Paraguay.

1. A free passage to families of agriculturists from any European port of embarkation to Monte Video, and thence to Asuncion.

2. Direct conveyance from Europe of all luggage entrusted to the Paraguayan Consul at the port of embarkation, which saves all transshipment and customs' dues at Monte Video.

3. Free board and lodging at the "Immigrants' Home" at Asuncion during five days after arrival; and free conveyance of the immigrants and of their luggage to their ultimate destination.

Agricultural implements, tools, seeds, furniture, linen, and clothing, as also one sporting rifle for each male immigrant, are admitted free, without the payment of customs' dues.

4. A freehold allotment of 16 cuadras (30 acres) is granted to each family on the conditions stated below.

5. Each family located upon an allotment of one of the Government colonies receives gratis all the agricultural implements needed, seeds for the first year, a milk-cow with its calf, and one or two draught-oxen.

6. Immigrants who desire to enjoy these advantages are required to work during five years upon their allotment. On the expiration of this period they will receive a title-deed of the freehold of their land, as also certificates entitling them to the ownership of the animals supplied to them. Until these five years have expired they can neither part with their land nor with the animals referred to.

7. Each family installed upon an allotment on the conditions stated above, shall be entitled to select three additional allotments of similar extent, on payment of 1 dol. or 4s. a cuadra (2s. 2d. an acre).

8. In addition to these advantages, each family distinguished for its industry or knowledge of agriculture shall be entitled to one or two additional allotments as a premium. Government will likewise pay a premium of 10 dols. in gold (£2) for every thousand fruit trees planted during the first six years' occupancy.

9. Colonists are exempt from the payment of all direct taxes for a term of ten years, beginning with the day of their being placed in possession of their allotment.

Similar conditions have been conceded with reference to agricultural families who desire to settle in the government colony of "Presidente Gonzalez," which lies on the railway connecting Asuncion with Encarnacion. This colony covers an area of 12 square leagues of hilly ground, well wooded, and traversed by numerous rivulets. The "allotments" have an area of 16 cuadras (30 acres) each. Each agricultural family can purchase two of these allotments at the rate of 1 peso fuerte a cuadra, or by paying double that sum in ten equal annual instalments. The colonists

are likewise required to pay a surveyor's fee, which is not, however, to exceed 4 pesos fuertes a lot.

Families distinguished for their industry and good conduct may be permitted to acquire up to five allotments.

A family which, in the course of two years, plants or sows 16 cuadras, is granted an additional 32 cuadras.

An agricultural family is to consist of at least a husband and his wife ; but bachelors of good repute may also be admitted to the benefits of colonists ; as also "outsiders," after they have been working in the colony as labourers during six months.

Each family is supplied on its demand with a saw, a grindstone, a bench-axe for each male, a hatchet, a shovel, a cutlas and spade for each working member of the family, a milk-cow with a calf, two draught-oxen with harness, and a plough. These articles will be charged cost price, and are to be paid for in three instalments, beginning two years after the arrival of the colonists.

Seed for the first year is supplied gratis.

The administrative authority of the colony will open a store and supply butchers' meat at cost price. Colonists are not permitted to open stores until after a five years' residence.

Incapable colonists may be removed on payment of compensation for improvements which they may have effected.

The colonists are entitled to share in the prizes offered by an Act of December 20, 1890, for Agricultural and Industrial Progress. These prizes amount annually to 200,000 pesos, and are intended to encourage the cultivation of tobacco, sugar-cane, cotton, grapes, oranges, lemons, bananas, pine-apples, maize, rice, manioc, lucerne, ramie, and ground-nuts, or the establishment of sugar-mills, distilleries, saw-mills, oil-mills, cigar-manufactories, &c.

Further information on questions connected with these colonies is to be obtained from the Consul-General of Paraguay, or from the "Oficina de Informaciones y Canjes," Asuncion. A circular of this "Inquiry Office," dated Nov. 24, 1891, warns persons not practically acquainted with agricultural operations against coming out to Paraguay, and points out that the advantages held out to colonists are intended only for "families of agriculturists."

For conditions on which the vast territories granted to the London bondholders can be settled, application should be made to the secretary of the Anglo-Paraguayan Land Company, New Broad Street Buildings, London, E.C.

III.—MONEY, WEIGHTS, AND MEASURES OF PARAGUAY.

MONEY.—The peso or dollar is divided into 100 centavos. Prices are made in gold, in silver (peso fuerte), or in currency (paper).

The legal value of the gold peso or dollar is = 4s. = 5 francs = 1 American dollar = 2,000 Brazilian reis, &c.

The silver peso varies in value according to the gold price of silver, and averaged during the last three years 2s. 7d.

On November 30, 1891, 1 peso in gold was worth 5·60 pesos in paper ; 1 peso in silver was worth 3·70 pesos in paper. In other words, 1 paper peso = 18 centavos in gold = 28 centavos in silver = 8·66 pence.

WEIGHTS.—The metrical system has been obligatory in the Republic since 1886, but practically the old weights and measures have remained in use.

1 libra (divided into 16 onzas) = 1·014 lbs. avoirdupois.

1 arroba = 25 libras = 25·35 lbs.

1 quintal = 4 arrobas = 101·4 lbs.

1 tonelada = 20 quintals = 2,028 lbs. = 18 cwt. 18 lbs.

1 azumbra = 36·89 lbs.

MEASURES OF LENGTH :—

1 vara = 3 piés (feet) = 0·8666 meters = 2·843 English feet.

1 cuadra = 100 varas = 86·66 meters = 284·3 feet.

1 cuerda or liña = 83 varas = 71·93 meters = 235·1 feet.

1 legua (league) = 5,000 varas = 4,333 meters = 14,215 feet = 2·692 statute miles.

MEASURES OF SURFACE :—

1 square vara = 0·75099 sq. meters = 8·0838 sq. feet.

1 square cuadra = 10,000 sq. varas = 7,510 sq. meters = 1·854 acres.

1 square legua = 2,500 square cuadras = 1,876 hectares = 4,635 acres.

1 square legua (land measure) = 1,769 hectares = 4,365 acres.

MEASURES OF CAPACITY :—

1 almuda = 24 litres = 5·28 gallons.

1 fanega = 12 almudas = 288 litres = 7·9 bushels.

1 frasco = 4 cuartos = 3·03 litres = 5·33 pinta.

1 baril = 32 frascos = 96·93 litres = 21·3 gallons.

1 pipa = 192 frascos = 581·5 litres = 128 gallons.

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